

AD-A045 025

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG--ETC F/G 1/5
A BIBLIOGRAPHY WITH ABSTRACTS OF U.S. ARMY ENGINEER WATERWAYS E--ETC(U)
AUG 77 M P MEYER, V DALE
PSTIAC-5-VOL-2-PT-1

UNCLASSIFIED

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1 of 5
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(14) PSTIAC-S-Vol-2-Pt-1



(2)



PSTIAC REPORT NO. 5

(6) A BIBLIOGRAPHY WITH ABSTRACTS OF
U. S. ARMY ENGINEER WATERWAYS
EXPERIMENT STATION PUBLICATIONS
RELATED TO PAVEMENTS.

Volume II.

REPORT DOCUMENT PAGE DATA.

PART I: BULLETINS, INSTRUCTION REPORTS, MISCELLANEOUS PAPERS,

by

(10) Marvin P. Meyer and Virginia Dale

Pavements and Soil Trafficability Information Analysis Center
and Technical Information Center

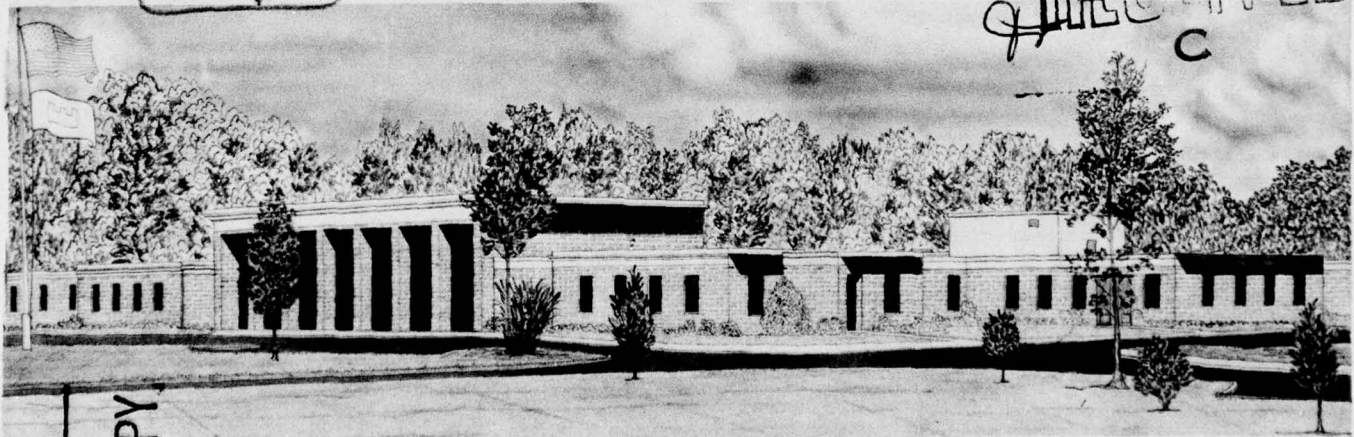
U. S. Army Engineer Waterways Experiment Station
P. O. Box 631, Vicksburg, Miss. 39180

(11) August 1977

Approved For Public Release; Distribution Unlimited

(12) 478p.

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Prepared for U. S. Army Materiel Development and Readiness Command
5001 Eisenhower Avenue
Alexandria, Va. 22333

Under Project No. IE865803M76105

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(16)

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PART 1

BULLETINS
INSTRUCTION REPORTS
MISCELLANEOUS PAPERS

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UNANNOUNCED		<input type="checkbox"/>
INSTRUCTION		<input type="checkbox"/>
BY		
DISTRIBUTION/AVAILABILITY NOTES		
DATE		
A		

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
		2b. GROUP	
3. REPORT TITLE			
CERTAIN CONSIDERATIONS IN THE DESIGN OF FLEXIBLE PAVEMENTS, BASES AND SUBGRADES			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1947		31	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.		Bulletin No. 29	
C.		8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.		AD 077 625	
9. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Mississippi River Commission	
13. ABSTRACT			
Contents:			
Importance and Practicability of Compaction for Subgrades and Bases, by W. J. Turnbull			
Design of Flexible Pavements for Multiple-Wheel Loads, by Charles R. Foster			
KEYWORDS: Compaction (Soils); Flexible pavement design (Airfields)			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

REPORT CLASSIFICATION

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Comorate author)		1a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
INSTRUCTIONS FOR USE OF FIELD IN-PLACE CALIFORNIA BEARING RATIO APPARATUS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE		
April 1956		
7a. TOTAL NO. OF PAGES		
5		
7b. NO. OF REFS		
8a. CONTRACT OR GRANT NO.		
8b. ORIGINATOR'S REPORT NUMBER(S)		
Instruction Report No. 1		
9. PROJECT NO.		
9a. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		
12. SPONSORING MILITARY ACTIVITY		
13. ABSTRACT		
<p>The Waterways Experiment Station developed and constructed a set of field CSR equipment which was given extensive field use in several large-scale tests. Field tests were compared with laboratory undisturbed cylinder tests and, in general, good correlation was found to exist. Since its development, this equipment has undergone periodic improvements. Improvements have included reduction in weight, simplification of the swivel, addition of a higher speed gear, and addition of level bubble. It is anticipated that the jack will be further simplified by replacing the present machined housings with cast aluminum housings. This equipment and its use in field testing are described. Photographs and detailed drawings illustrating this equipment are also included.</p>		
KEYWORDS: California Bearing Ratio; California Bearing Ratio tests; Field tests; Laboratory tests		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>1. DURING THE CLASSIFICATION OF THIS REPORT, the classification of the report must be entered in the overall report classification.</small>		
2. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		3a. REPORT SECURITY CLASSIFICATION Unclassified 3b. GROUP
3. REPORT TITLE FIELD DENSITY DETERMINATIONS BY SAND VOLUME AND DRIVE CYLINDER METHODS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (first name, middle initial, last name)		
6. REPORT DATE April 1957	7a. TOTAL NO. OF PAGES 8	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. 8. PROJECT NO. 8c. 8d.	9a. ORIGINATOR'S REPORT NUMBER(S) Instruction Report No. 2 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The in-place density determination on any type of base course or subgrade materials may be made by the sand-displacement method. Density determinations on moist, cohesive fine-grained materials may also be made by the drive cylinder method. Determinations by oil-displacement are not considered because the residual oil and spillage have a tendency to soften asphaltic concrete. The sand-displacement and drive cylinder methods are described		
KEYWORDS: Base courses; Drive cylinder method; Sand cone method; Soil density measuring devices; Subgrades		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		4a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		4b. GROUP
2. REPORT TITLE		
DEVELOPING A SET OF CBR DESIGN CURVES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
R. G. Ahlvin		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1959	10	7
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
A. PROJECT NO.		Instruction Report 4
C.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
D.		AD 658 078
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report shows how, beginning with the pattern for the low CBR range, the combined CBR curve, supplemented by related information and judgment, can be used to extend single-wheel relations into the high CBR range. It also shows how, by the use of equivalent single-wheel loads, the single-wheel design criteria can be applied to any multiple-wheel configuration. Finally, means are indicated for further extending either single- or multiple-wheel design criteria to criteria for intense usage or for various levels of limited usage based on load repetitions (coverages). An appendix provides a detailed example of the method by which theoretical maximum deflections are developed for single- and multiple-wheel assemblies and combined to establish a relation between multiple- and single-wheel loads.</p>		
KEYWORDS: California Bearing Ratio; Design standards; Equivalent single-wheel load; Traffic loads		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

UNCLASSIFIED Security Classification		DOCUMENT CONTROL DATA - R & D		MP
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)				
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified		
3. REPORT TITLE		2b. GROUP		
DESCRIPTION AND APPLICATION OF AIRFIELD CONE PENETROMETER				
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)				
5. AUTHOR(S) (First name, middle initial, last name)				
William B. Fenwick				
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
October 1965		13		
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO. (FY 1966 Program Guidance - Task-01)		Instruction Report 7		
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.		AD 800 746		
10. DISTRIBUTION STATEMENT				
Approved for public release; distribution unlimited.				
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY		
		U. S. Army Materiel Command Washington, D.C. 20315		
13. ABSTRACT				
<p>This report describes the airfield cone penetrometer, its use, and the application of data obtained by its use. The report includes information which will assist in solving specific trafficability problems. Also procedures are presented for using the airfield penetrometer to measure soil strength and for correlating soil strength with the number of passes that can be made by aircraft having various wheel loads and tire pressures.</p>				
KEYWORDS: Airfield cone penetrometer; Trafficability				

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DOCUMENT CONTROL DATA - R & D		
<small>(Exempt from automatic downgrading and declassification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		20. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		21. GROUP
2. REPORT TITLE		
WET TRACK ABRASION TEST FOR DESIGN OF ASPHALY SLURRY SEALS		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(S) (First name, middle initial, last name)		
5. REPORT DATE		
March 1969		
6. CONTRACT OR GRANT NO.		7a. TOTAL NO. OF PAGES
		4
7. PROJECT NO.		8. ORIGINATOR'S REPORT NUMBER(S)
		Instruction Report S-69-1
		9. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
		AD 739 999
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army
13. ABSTRACT		
<p>This method of test is intended for measuring the wearing qualities of thin, fine aggregate bituminous surfacings, such as slurry seals, under wet abrasion conditions. It may also be used for design purposes to establish the optimum quantity and type of binder consistent with wear resistance of the surfacing.</p>		
KEYWORDS: Abrasion tests; Asphalts; Sealing compounds; Slurries		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Originator's name) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
		3. GROUP
4. REPORT TITLE USE OF POLYPROPYLENE-ASPHALT MEMBRANE AS AN EXPEDIENT SURFACING MATERIAL IN THE THEATER OF OPERATIONS		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name) C. D. Burns V. C. Barber		
7. REPORT DATE April 1969	7A. TOTAL NO. OF PAGES 27	7B. NO. OF REFS
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-69-2	
A. PROJECT NO. OCE/O&M, A Project Q6-1-04		
C. Work Unit 26	9B. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 744 872	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army
13. ABSTRACT The purpose of this report is to describe polypropylene-asphalt surfacing, show its capabilities, and set forth application techniques. The report includes information as to personnel and equipment requirements for installing polypropylene-asphalt surfacing, exact methodology of application, and procedures for airfield, road, and other subgrade preparation. Procedures for repair of damaged polypropylene-asphalt surfaced areas are set forth along with storage and handling pointers for the surfacing materials.		
KEYWORDS: Expedient surfacings; Military operations; Polypropylene asphalt membrane		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE INSTALLATION OF XM18 EXTRUDED ALUMINUM AIRFIELD LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Dewey W. White, Jr.		
6. REPORT DATE July 1969	7a. TOTAL NO. OF PAGES 39	7b. NO. OF REFS 7
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-69-3	
b. PROJECT NO. 1G664717D556	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 856 706	
c. Task 01		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT This report presents a description of XM18 extruded aluminum airfield landing mat and the ancillary items that are used with it and outlines procedures for the installation and replacement of the mat and ancillary items. These procedures are presented as a guide for the user in the theater of operations.		
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Landing mat construction; [XM18 landing mat]		

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DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
INSTALLATION OF XM19 AIRFIELD LANDING MAT AND ANCILLARY ITEMS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Hugh L. Green Dave A. Ellison		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1969	43	3
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 1G664717D556		Instruction Report S-69-4
c. Task 01		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD 856 534
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>This report presents a description of XM19 sandwich-type aluminum airfield landing mat and the ancillary items that are used with it and outlines procedures for the installation and replacement of the mat and ancillary items. These procedures are presented as a guide for the user in the theater of operations.</p>		
<p>KEYWORDS: Aluminum landing mats; Landing mat construction; [XM19 landing mat]</p>		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		20. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		22. GROUP
INSTALLATION OF XM19 AIRFIELD LANDING MAT AND ANCILLARY ITEMS; APPENDIX B: PLACEMENT OF XM19 SPECIAL SURFACING LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
G. L. Carr		
6. REPORT DATE	74. TOTAL NO. OF PAGES	75. NO. OF REFS
June 1973		
8A. CONTRACT OR GRANT NO.	8A. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO. 1G66471TDH01	Instruction Report S-69-4 Appendix B	
C. Task 10	8B. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 762 137	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command
13. ABSTRACT		
<p>The purpose of this appendix is to furnish installation instructions for placement of the XM19 special surfacing mat when the mats are placed in conjunction with standard XM19 mat. (The XM19 special surfacing is placed only in those critical areas of a runway which are identified as the hook arresting cable areas). All methods of evaluation and maintenance, such as repair of antiskid, cleaning and bundling panels for reuse, and determination of mat reusability, which are not described herein, are the same as similar procedures discussed in the report to which this is an appendix.</p>		
KEYWORDS: Aluminum landing mats; Landing mat construction; [XM19 landing mat]		

DD FORM 1-73

REPLACES DD FORM 1-73, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified
2. REPORT TITLE		
MEMBRANE-ENVELOPED SOIL LAYERS AS BASE COURSES FOR AIRFIELDS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
C. D. Burns W. N. Brabston		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1969	20	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO. USAF MIFR's AS-6-265 and AS-6-266	Instruction Report S-69-5	
C.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
2	AD 739 565	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Air Force
13. ABSTRACT		
<p>This manual provides information and guidance for the design, construction, and maintenance of membrane-enveloped soil layers (MESL) as base courses on airfields in the theater of operations (TO). It is not intended that MESL-type construction, as defined herein, replace the conventional method of using select materials, such as gravels, crushed rock, etc., for base course construction when these materials are available. However, in the absence of conventional base course materials, an adequate runway base can be built from purely fine-grained soils using the techniques of MESL-type construction described herein.</p>		
KEYWORDS: Airfields; Base courses; Membrane enveloped soil layer		

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Discipline classification of title, body of abstract and indexing operation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE LANDING MAT OVERLAYS ON DETERIORATED LANDING MAT OR PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) C. D. Burns W. N. Brabston		
6. REPORT DATE June 1969	7a. TOTAL NO. OF PAGES 12	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO. A. PROJECT NO. USAF MIPR AS-7-203		8b. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-69-6
9. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 739 566
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Air Force
13. ABSTRACT This manual provides instruction and guidance for the design, construction, and maintenance of a landing mat overlay that can be built over a smooth but inadequate strength pavement or over a deteriorated landing mat or pavement surface in order to provide a suitable landing facility for the operation of tactical aircraft.		
KEYWORDS: Landing mats; Overlays (Landing mats)		

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Unclassified

Security Classification

Unclassified
Security Classification

MP

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE RAPID ASSESSMENT OF SOIL STRENGTH AT AIRCRAFT LANDING SITES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) George M. Hammitt II		
6. REPORT DATE April 1970	7a. TOTAL NO. OF PAGES 11	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-70-1	
9a. PROJECT NO.		
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	AD 705 572	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C.
13. ABSTRACT This report presents a method of rapidly assessing the ability of an area to support aircraft operations. The method involves no special equipment or specially trained personnel, but is based on the interrelation of the response of ground surfaces of various strengths to vehicular and aircraft traffic. Data that allow the forecasting of the ability of an area to support aircraft traffic are tabulated herein. This ability is based on the rut depth occurring in a soil after one pass of a standard military vehicle.		
KEYWORDS: Aircraft landing areas; Soil strength; Unsurfaced airfields		

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CRITERIA FOR INSPECTION, EVALUATION, CLASSIFICATION, AND REUSE OF USED AIRFIELD LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros Donald N. Brown		
6. REPORT DATE May 1970	7a. TOTAL NO. OF PAGES 74	7b. NO. OF REFS 1 (in text)
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-70-2	
8c. PROJECT NO.		
8d.	8e. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 708 891	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This instruction report presents a method for the systematic separation and classification of used panels of M8A1, AM2, XML8, and XML9 landing mats as reusable or unsuitable for future use as light- or medium-duty landing mat. For cases in which the used mat is not suitable for airfield surfacing, suggested secondary uses are presented.		
KEYWORDS: Landing mat recovery and reuse; Landing mats		

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
RESTORATION OF LANDING-MAT-SURFACED SUBGRADES BY GROUTING METHODS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns Victor C. Barber		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1970	12	None
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Instruction Report S-70-3	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 763	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. *SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>Engineering tests have been conducted at WES to determine methods of repairing damaged subgrades beneath landing mats by grouting. Use of portland cement grout consisting of portland cement, CaCl_2, water, and filler is effective to a limited extent. The grout can be pumped through 1-in.-diam holes drilled into the mat by use of a satisfactory grout pump. Suggested equipment includes a truck, concrete mixer, air compressor and pneumatic drill, grout pump, and a water truck.</p>		
KEYWORDS: Grouts; Landing mat maintenance; Subgrades		

DD FORM 1, NOV 61, 1473 REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Security Classification

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

KEYWORDS: Expedient surfacings; Membrane construction; Membrane maintenance; Membrane recovery and reuse; [XW18 membrane]

REPLACES DD FORM 1479, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station, CE Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
COMPUTER METHOD FOR AGGREGATE BLENDING		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Bernard E. Lutter Thomas D. White		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1970	21	0
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Instruction Report S-70-5	
9. PROJECT NO.		
c.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 756 127	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers Washington, D. C.
13. ABSTRACT		
<p>Present computer techniques for determining aggregate blends to meet a specified gradation for bituminous pavement mix design are not entirely satisfactory. Often aggregate blends must still be optimized by trial-and-error hand calculations to approximate the desired gradation. In addition to gradation limits and tolerances, there are limitations for the amounts of particular aggregates to be used in a mix design or for the total amount of fines that can be present in the mix. This study was undertaken to develop the logic for a computer optimization techniques that would blend the given aggregates to conform as closely as possible to the desired gradation and to fall within the specified limits. As a result, two computer programs have been written using two different optimization techniques and are presently being used for bituminous pavement mix design at the U. S. Army Engineer Waterways Experiment Station (WES). Both programs satisfy the requirements of this investigation.</p>		
KEYWORDS: Aggregate blending; Asphalt mix design; Computer programs; Flexible pavements		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE TECHNIQUES FOR RAPID ROAD CONSTRUCTION USING MEMBRANE-ENVELOPED SOIL LAYERS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph Steve L. Webster		
6. REPORT DATE February 1971	7a. TOTAL NO. OF PAGES 49	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-71-1	
8c. PROJECT NO. 4A062112A859		
8d. Task 01	8e. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 720 194	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT The purpose of this instruction report is to provide information and guidance for the construction and maintenance of membrane-enveloped soil layers (MESL) as base courses on roadways in the theater of operations. The concept involves complete encasement of a compacted layer of fine-grained soil by a lower and upper waterproof membrane. The upper membrane is capable of supporting limited rubber-tired traffic operations. It is formed by applying emulsified asphalt to the surface of the soil layer, placing polypropylene material, applying a second coat of asphalt, and then placing a blotter layer of sand. An MESL road system is applicable for use on roadways where materials for conventional construction of foundation layers are not available without considerable expenditure of time, effort, or money. However, use of the MESL concept as permanent road construction practice has not been proved feasible. Construction techniques for roads with shoulders utilize the in-place roadbed soil in the MESL. The process involves removing the soil and stockpiling it on the shoulders, placing the lower membrane, replacing the soil on the lower membrane, compacting the soil layer, and then installing the upper wearing membrane. The procedures can be combined to form a continuous train-type construction operation. Construction techniques for roads without shoulders, such as through cuts or on narrow fills, involve working with half the road at a time. The in-place roadbed soil is used in the MESL. Construction techniques for roads on soft subgrades, such as in low-lying areas with high water tables, are based on hauling a local soil having a suitable water content and using this soil in the MESL. KEYWORDS: Base courses; Membrane enveloped soil layers; Rapid road construction		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
MAINTENANCE AND REPAIR PRACTICES FOR PAVEMENTS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1971			
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Instruction report S-71-2	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Headquarters, U. S. Continental Army Command, Fort Monroe, Virginia	
13. ABSTRACT			
<p>Maintenance and repair of gravel and other miscellaneous surfaces is required more frequently but is less complicated than that of more permanent facilities. Maintenance of these facilities, due to their traffic and water-susceptible nature, is usually a function of the intensity and frequency of traffic and precipitation to which they are subjected. Continuous observance of the basic maintenance and repair ideas mentioned herein should result in facilities that will perform the functions for which they were designed.</p>			
KEYWORDS: Flexible pavement maintenance; Rigid pavement maintenance			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Security Classification

KEYWORDS: Geometric design; Military operations; Military roads; Military vehicles

DD FORM 1473
1 NOV 66

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE		
EMPLACEMENT AND MAINTENANCE OF DUST-CONTROL MATERIALS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
M. M. Culpepper		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1972		
8a. CONTRACT OR GRANT NO.	8a. ORIGINATOR'S REPORT NUMBER(S)	
	Instruction Report S-72-3	
8b. PROJECT NO. 1G664717DE01, Task 12		
c.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 756 179	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command
13. ABSTRACT		
<p>The purpose of this report is to provide guidance for those engineer construction troops or troops of the field Army who will emplace and maintain dust-control material(s) in conjunction with the construction and maintenance of aircraft and helicopter landing facilities. It contains information concerning techniques and construction procedures used successfully during the engineer design tests of the dust-control materials.</p>		
<p>KEYWORDS: Aircraft landing areas; Dust control; Landing field construction; Landing field maintenance</p>		

DD FORM 1473
1 NOV 65

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION AND MAINTENANCE OF EXPEDIENT-SURFACED AIRFIELD FACILITIES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros, Jr.		
6. REPORT DATE May 1973	7a. TOTAL NO. OF PAGES 23	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Instruction Report S-73-1	
8c. PROJECT NO.		
8d.	8d. OTHER REPORT NO.(S) (Any other numbers that may be assigned this report) AD 762 126	
9. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This instruction report presents a reference of suggested guidelines on the evaluation and maintenance of expedient-surfaced airfield facilities. The expedient surfacing materials covered in this discussion are aluminum and steel landing mats and a neoprene-coated nylon membrane. Methods of repair that have performed satisfactorily for the landing mats and T17 membrane are presented.		
KEYWORDS: Airfield maintenance; Aluminum landing mats; Expedient surfacings; Membranes (Airfields); Steel landing mats		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

MEP

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
DETERMINATION OF IN-PLACE MOISTURE AND DENSITY BY NUCLEAR METHODS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Steve L. Webster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1974	23	0
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO. Q6-1	Instruction Report S-74-1	
c. Task 06	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d. Work Unit 002	AD 779 422	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>Nuclear gages offer a rapid and accurate means for obtaining moisture and density values for a wide variety of materials. Recent advances in the design of nuclear equipment and a better understanding of the nuclear principles involved have led to increasingly widespread use of nuclear gages in earth construction control work. This report describes surface-type nuclear equipment, procedures, and various test methods used for making shallow-depth moisture and density determinations in place on soil and soil-aggregate mixtures. In general, a 6-in. direct transmission density test using a properly operating nuclear gage and an up-to-date factory calibration curve will yield test results slightly better than those of conventional density tests. The factory moisture calibration curve, however, must be checked and adjusted (if necessary) for each material tested. The nuclear test is simpler to perform than conventional tests and requires only about 15 min to obtain both a density and moisture test result.</p>		
KEYWORDS: Nuclear equipment; Nuclear methods; Soil aggregates; Soil density measuring devices; Soil moisture measuring devices; Unit weight determination; Water content determination		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		Unclassified
		2b. GROUP
3. REPORT TITLE		
INSTALLATION OF HEAVY-DUTY TRUSS-WEB EXTRUDED ALUMINUM AIRFIELD LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Dewey W. White, Jr.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1974	37	6
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
a. PROJECT NO. 1G764717DH01, Task 10		Instruction Report S-74-2
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD 779 423
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C. 20315
13. ABSTRACT		
<p>This report presents a description of the heavy-duty truss-web extruded aluminum airfield landing mat and the ancillary items that are used with it and outlines procedures for the installation and replacement of the mat and ancillary items. These procedures are presented as a guide for the user in the theater of operations.</p>		
<p>KEYWORDS: Airfields; Aluminum landing mats; Extrusions (Landing mats); Heavy duty landing mats; Landing mat construction; [Alcoa landing mats]</p>		

DD FORM 1473

NOV 65

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

DD FORM 1473 EDITION OF 1 NOV 68 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. ABSTRACT (Continued)

help the engineer select the type and quantity of additive required if chemical stabilization is used. The methods considered in this report for improving the physical properties of low-quality materials are mechanical and chemical stabilization and waterproofing techniques. Information is also given to help in the selection of the appropriate construction equipment for a particular operation. Detailed construction procedures are outlined for the various types of stabilization.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

EP

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Instruction Report M-75-1	2. GOVT ACCESSION NO. AD B004 845L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AUTOMATED PROCEDURE FOR AIRFIELD SITE EVALUATION		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Malcolm P. Keown Judith A. Parks Jack K. Stoll		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Mobility and Environmental Systems Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A062103A859, Task 05, Work Unit 013, and 4A162121AT31, Task 02, Work Unit 02
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE June 1975
		13. NUMBER OF PAGES 144
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Distribution limited to U. S. Government agencies only; computer program documentation; June 1975. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss., ATTN: WESFE.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Airfield site selection Site investigation Airfields Computer programs Evaluations		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Instructions are provided for the use of a set of related computer programs that collectively represent an automated procedure for airfield site evalua- tion. Properly used, this set of programs permits evaluation of potential airfield sites in terms of geometry and construction time and cost. Instruc- tions for the collection of the required input data and arrangement of these data into the correct computer input format are provided. The quantity of in- put data to be collected by the user is minimized by the inclusion of several (continued)		

DD FORM 1473 EDITION OF 1 NOV 65 IS OBSOLETE

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. ABSTRACT (continued).

tables from which much of the data can be obtained. The output data include relevant airfield geometric parameters and time and cost estimates for the site preparation and runway surfacing phases of airfield construction. These data are interpreted to aid the user in the decision-making process. A discussion of error messages is included to assist the user in eliminating problems related to input data.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Instruction Report S-75-1	2. GOVT ACCESSION NO. AD A014 164	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SLURRY SEAL SURFACE TREATMENTS		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Lenford N. Godwin		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P.O. Box 631, Vicksburg, Mississippi 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS O&MA Project No. 4K-78012AQ61, Task 04, Work Unit 007
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE June 1975
		13. NUMBER OF PAGES 60
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Construction control Slurries Surface treatment (Roads)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared to aid the facilities engineer in prescribing and constructing slurry seals. The report identifies the potential areas of slurry seals application and discusses material requirements, field construction processes, and techniques to assist the facilities engineer in placing good quality slurry seals. A summary of a recommended laboratory design method for proportioning the materials of the slurry seal mixture and a modified version of construction guide specification CE-807.23 for emulsified asphalt slurry seal surface treatments are also presented herein.		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

EP

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Instruction Report M-76-1	2. GOVT ACCESSION NO. v.1, ADA030 173 v.2, ADB013 638L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AUTOMATED PROCEDURE FOR EVALUATING SITES FOR SUITABILITY AS HELICOPTER LANDING ZONES		5. TYPE OF REPORT & PERIOD COVERED Final report
7. AUTHOR(s) Judith A. Parks		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Mobility and Environmental Systems Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314 and U. S. Army Materiel Development and Readiness Command Alexandria, Virginia 22333		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 4A162121AT31, Task 02, Work Unit 02 and No. 1T162112A528, Task 02, Work Unit 02
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE June 1976
		13. NUMBER OF PAGES 315
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Volume I--Approved for public release; distribution unlimited. Volume II--Distribution limited to U. S. Government agencies only; computer program documentation; June 1976. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station (WESFE)		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Volume I--Description and Instructions for Use of Computer Programs Volume II--Listings of Computer Programs		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Aircraft landing areas Mathematical models Airfield site selection Site selection Computer programs Helicopter landing zones		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report contains instructions for operating a model that is an automated procedure for evaluating designated sites as helicopter landing zones. The model is comprised of three independent computer programs run sequentially. Program 1 (FTHEL) evaluates the site in terms of generalized conditions (Continued)		

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. ABSTRACT (Continued).

of slope, microrelief, and soil strength as related to the requirements set by certain characteristics of the helicopter that is to land. The program determines whether the site can provide a full-touch zone, a skid-touch zone, a nontouch zone, or no landing zone at all, and computes the minimum departure angle for the specified helicopter if a landing zone is possible.

Program 2 (FTJPRH) is an automated mathematical procedure for predicting the size and shape of a clearing in a forested area by considering blast forces from a bomb explosion, tree stem strength, stem diameter, and distance from ground zero (GZ), the center of the explosion. The clearing is described by a vegetation profile of tree remnant height versus the distance from GZ.

Program 3 (FTJPHL) of the model is an automated procedure for evaluating a clearing by estimating how many trees must be removed from a clearing produced by a high-yield, air-dropped munition in order to use the clearing as a full-touch helicopter landing zone. The output is the number of tree remnants that must be removed to satisfy the landing requirements of a specified helicopter.

All three computer programs were designed and written for use on a Honeywell G-635 computer system equipped with extensive time-sharing capability, coded in FORTRAN language, and run in conversational mode by means of a conventional teletype terminal. Maximum core storage for any one program is 10K words.

This report is intended to serve as a guidebook for the individual responsible for running the programs and requires a working knowledge of computer techniques and terminology and various methods pertinent to data processing.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of this, body of abstract and index/annotation must be uniform when the overall report is classified.)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		12b. GROUP
3. REPORT TITLE		
CONDITION SURVEY; REPORT 1, SEWART AIR FORCE BASE, SMYRNA, TENNESSEE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
J. F. Redus		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1952	14	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper 4-3, Report 1	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding the as-constructed condition of newly constructed pavements at Sewart Air Force Base for use in (a) studies of pavement behavior under traffic, and (b) studies of changes that occur in subgrade moisture content with time. These data were collected and recorded for future use.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Subgrades; [Sewart Air Force Base, Smyrna, Tenn.]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R 3-D		
1. ORIGINATOR'S ACTIVITY (Corporate author)		15a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2b. GROUP		
3. REPORT TITLE		
CONDITION SURVEY; REPORT NO. 2, POPE AIR FORCE BASE, FORT BRAGG, NORTH CAROLINA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Z. B. Fry		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1952	10	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-3, Report No. 2	
4. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 010 210	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding the condition of pavements at Pope Air Force Base for use in studies of pavement behavior under traffic.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Pope Air Force Base, Fort Bragg, N. Carolina]</p>		

DD FORM 173 REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY: REPORT NO. 4, ARDMORE AIR FORCE BASE, ARDMORE, OKLAHOMA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
P. J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1953	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-3, Report No. 4	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 010 352	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted at Ardmore Air Force Base to evaluate the existing flexible pavements. The evaluation is to be combined with that of the rigid pavements prepared by the Rigid Pavement Laboratory, Ohio River Division, to form a complete evaluation of the field.</p> <p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Ardmore Air Force Base, Ardmore, Okla.]</p>		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Changes in classification of title, body of abstract, and indexing annotation must be entered when the overall report is classified</small>		
1. ORIGINATING ACTIVITY (Corporate author)		20. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		20. GROUP
3. REPORT TITLE		
CONDITION SURVEY; REPORT NO. 5, EGLIN AIR FORCE BASE, VALPARISO, FLORIDA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
W. J. Emrich		
6. REPORT DATE	7A. TOTAL NO. OF PAGES	7B. NO. OF REFS
June 1953	21	
8A. CONTRACT OR GRANT NO.	8B. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-3, Report No. 5	
9. PROJECT NO.		
C.	9B. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding the condition of pavements at Eglin Air Force Base for use in studies of pavement behavior under traffic. The field had received traffic from heavy planes and a few areas had shown distress. One runway at an auxiliary field was also tested to obtain data relative to pavement behavior and to re-evaluate the pavement.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Eglin Air Force Base, Valpariso, Florida]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Classification of this, body of abstract, and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate Author)	2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi	Unclassified	
	2b. GROUP	
3. REPORT TITLE		
CONDITION SURVEY, REPORT NO. 6. BOLLING AIR FORCE BASE, WASHINGTON, D. C.		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
A. H. Joseph		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1953	17	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-3. Report No. 6	
8. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding the conditions of the pavements at Bolling Air Force Base. This investigation is one of a series for use in a comprehensive study of flexible pavement behavior under traffic. Bolling Air Force Base was investigated because numerous failures had occurred, beginning soon after construction and continuing until the time of this investigation, and it was believed that a study of the pavements would provide useful research information concerning flexible pavement design criteria.</p> <p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Bolling Air Force Base, Washington, D. C.]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R 3 D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY: REPORT NO. 7, KIRTLAND AIR FORCE BASE, ALBUQUERQUE, NEW MEXICO, SURVEYS OF 1945-1952		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
J. F. Redus		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1954	23	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-3, Report No. 7	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted between October 1945-October 1952 to obtain data regarding pavement conditions at Kirtland Air Force Base. These surveys are part of a series of research studies of the relationship between pavement conditions and its behavior under traffic.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Kirtland Air Force Base, Albuquerque, New Mexico]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 55, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R 3.0		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
TENTATIVE DESIGN CURVES FOR MILITARY VEHICULAR TRAFFIC		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1952	11	6
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
8b. PROJECT NO.	Miscellaneous Paper No. 3-14	
8c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
8d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The purpose of this investigation is to determine the relation between vehicle loads and military road destruction, and to develop design data for flexible pavements subjected to traffic caused by an army division operating for periods of 10, 30, and 180 days. This report contains a set of tentative design curves which were derived from existing flexible pavement design data. The tentative design curves have not been verified by actual traffic tests.</p>		
KEYWORDS: Flexible pavement design (Highways); Military roads		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Consider classification of title, body of abstract and indexes annotation must be entered when the overall report is classified</small>		
1. ORIGINATING ACTIVITY (Corporate Author)		20. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		21. GROUP
3. REPORT TITLE		
DEVELOPMENT OF TENTATIVE CBR CURVES FOR AIRPLANE WHEELS ON UNSURFACED SOILS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1952	8	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO. 8-69-04-004	Miscellaneous Paper No. 4-16	
C.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.	AD 610 355	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The tests are not complete, but sufficient testing has been accomplished together with other tests conducted by the Ohio River Division Laboratories to warrant the development of tentative curves. This report presents the available data and tentative curves derived therefrom. The approach to the problem has been the same as that used in the analyses of the landing mat tests in that analyses have been made to show the reduction that can be applied to existing flexible pavement design curves.</p>		
<p>KEYWORDS: California Bearing Ratio Tests; Flexible pavement design (Airfields); Traffic tests; Unsurfaced runways</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

RECEIVED CONTROL DATA - RCD		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		3b. GROUP
DEVELOPMENT OF TENTATIVE CBR DESIGN CURVES FOR LANDING MATS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
C. R. Foster and C. D. Burns		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1952	16	11
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.	Miscellaneous Paper No. 4-29	
C.	8b. OTHER REPORT NO(S); (Any other numbers that may be assigned this report)	
D.	AD 008 639	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Soils and Cryology Branch, Research and Development Division, Military Operations
13. ABSTRACT		
<p>Before tentative design curves based on the earlier studies could be issued, sufficient testing was accomplished in the validation test program to show that tire pressure is a major factor in determining design requirements, and that the curves produced by the constant reductions required revision. Approximately 50 percent of the scheduled testing was completed by 31 December 1951, and an analysis of the results is presented herein, including tentative curves for single-wheel loads on M6 and M8 mat.</p>		
<p>KEYWORDS: California Bearing Ratio tests; Metal landing mats; Traffic tests; [M6 and M8 landing mats]</p>		

DD FORM 473

REPLACES DD FORM 473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of this, body of abstract, and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EXPERIMENTAL PAVEMENTS, PRESQUE ISLE AIR FORCE BASE, MAINE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
E. C. Meredith		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1952	22	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-32	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The purpose of this memorandum is to record pertinent information and make constructive criticism, particularly in connection with the three tar mixes, concerning design, manufacture, and placement of bituminous mixtures which are not yet in large-scale use but are scheduled for use at several bases in the United States and at the Waterways Experiment Station in the near future.</p>		
<p>KEYWORDS: Asphalt mix design; Flexible pavement construction; Flexible pavement design (Airfields); [Presque Isle Air Force Base, Maine]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		24. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		25. GROUP
JET OPERATIONS ON PARKING APRONS AT EGLIN, MACDILL, AND PINECASTLE AIR FORCE BASES AND RECOMMENDED TEST PROCEDURE TO SIMULATE THE OPERATIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1953	14	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-34	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The primary purpose of the survey was to determine normal amounts and frequency of fuel spillage and a realistic ratio of traffic to spillage on a given area. These normal amounts of fuel are to be spilled at the determined frequency on one traffic lane of the recently constructed tar-rubber test section at the Waterways Experiment Station, and traffic applied as required.</p>		
<p>KEYWORDS: Jet fuel spillage (Pavements); Simulation; Test procedures; [Eglin, MacDill, and Pinecastle Air Force Bases, Florida]</p>		

DD FORM 1473
1 NOV 61

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security Classification of this, body of abstract and subject annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
COLLECTION OF AVAILABLE DATA ON SHELL AGGREGATE FOR BITUMINOUS PAVING MIXES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1954	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.	Miscellaneous Paper No. 4-38	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
All data on shell aggregate that are available at the Waterways Experiment Station to date are summarized. Presentation and discussion of data and summary of present status of knowledge are given.		
KEYWORDS: Aggregates; Bitumens; Shells (Construction material)		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

UNCLASSIFIED CONTROL DATA REPORT		
1. ORIGINATING AGENCY (Corporate authority)		2. SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		
REPORT OF LIMITED LABORATORY TESTS ON BAROMIX		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1953	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-43	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Distribution limited to US Govt agencies only; Jan 1974; HQDA (DAEN-MCE-D)		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
Tests on Baromix were conducted as a part of the current materials investigation of the Waterways Experiment Station. Reports on mix design tests, weathering tests, and storage of Baromix powder.		
KEYWORDS: Additives; Asphalt mix design; [Baromix]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
LIMITED INVESTIGATION OF USE OF EMULSIFIED ASPHALT IN HOT-MIX ASPHALTIC CONCRETE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1953	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.	Miscellaneous Paper No. 4-44	
C.	8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
<p>The test program described was carried out as a part of the materials investigation program of the Flexible Pavement Laboratory, Waterways Experiment Station. The object of these tests was to obtain some preliminary indications as to the feasibility of combining hot aggregate with an asphalt emulsion to produce a satisfactory paving mixture.</p>		
KEYWORDS: Asphalt mix design; Hot mix; Liquid asphalt		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
STUDY OF EFFECT OF ASPHALT CONTENT ON BITUMINOUS PAVEMENT DURABILITY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1953	2	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-45	
8b. PROJECT NO.		
8c.		
8d.		
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
Some data have recently been obtained in connection with studies of the effect of jet-fuel spillage on bituminous pavements that may be significant from the standpoint of pavement durability.		
KEYWORDS: Asphalts; Durability tests; Flexible pavements; Jet fuel spillage (Pavements)		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
TENTATIVE CHANGES INDICATED IN VOIDS CRITERIA FOR BITUMINOUS PAVING MIXES WHEN USING "BULK-IMPREGNATED" SPECIFIC GRAVITY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1953	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-46	
c.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
Report describes a study of the over-all adjustment in voids criteria required when "bulk-impregnated" specific gravity is used.		
KEYWORDS: Asphalt mix design; Bitumens; Specific gravity; Voids		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Indicate classification of title, body of abstract and indexing notation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
SUBGRADE PREPARATION FOR OVERLAY, TEST TRACK NO. 2, SHARONVILLE, OHIO		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1953	8	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-47	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Ohio River Division Laboratories
13. ABSTRACT		
<p>The objectives of the subgrade preparation were to process the subgrade for the top 6 to 8 in., adjust the moisture content as required, and compact with a rubber-tired roller to obtain a uniform subgrade having a CBR of from 2 to 4 per cent within the top 6 in. These objectives were accomplished by the following operations: a. Removal of the top overburden and unsuitable materials. b. Cutting and filling to the desired subgrade elevation. c. Processing by adding water and mixing with pulvimixer. d. Compacting with rubber-tired roller. Water content, density, in-place CBR, and cone penetrometer tests were made during and after construction.</p>		
KEYWORDS: Compaction (Soils); Subgrades; [Sharonville, Ohio]		

DD FORM 1473
1 NOV 55

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>Security Classification of this form of abstract and indexing annotation must be entered when the overall report is classified</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
ROLLING RESISTANCE TESTS ON LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1953	17	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
A. PROJECT NO.		Miscellaneous Paper No. 4-51
C.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
D.		AD 126 281
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Special Engineering Branch, Engineer Research and Development Division, Troop Operations
13. ABSTRACT		
<p>The objectives of the rolling resistance tests were to determine the effects of subgrade strength, wheel load, and tire pressure on the force required to start a load wheel moving, and the force required to keep the load wheel moving on different types of surfaces.</p>		
<p>KEYWORDS: Landing mats; Motion resistance; Tire-pavement interaction; Traffic tests</p>		

DD FORM 1473

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATOR'S ADDRESS (Corporate author)		24. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		25. GROUP
TRAFFIC TESTS ON METAL AND VINYL MEMBRANES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1953	6	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. L-54	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Special Engineering Branch, Engineer Research and Development Division, Troop Operations
13. ABSTRACT		
<p>Report presents the results of tests made to determine the suitability of thin sheet aluminum as a runway surfacing material in theaters of operation together with results of comparative tests on a vinyl membrane.</p>		
<p>KEYWORDS: Aluminum; Membranes (Airfields); Resins (Synthetic); Traffic tests; Vinyl resins</p>		

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Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
2b. GROUP			
3. REPORT TITLE			
AN INVESTIGATION OF THE WATER PERMEABILITY AND JET-FUEL RESISTANCE OF A BITUMINOUS CONCRETE PAVING MIX AT VARIOUS DEGREES OF DENSITY			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1952		6	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.		Miscellaneous Paper No. 4-57	
C.		8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.			
9. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT			
<p>This investigation was devoted entirely to a study of the effect of degree of density upon the perviousness and fuel resistance of a typical paving mix. This mix was prepared using crushed-limestone aggregate meeting current gradation requirements for pavements designed to withstand jet-plane operations.</p>			
<p>KEYWORDS: Bituminous concretes; Jet fuel resistant materials; Jet fuel spillage (Pavements); Waterproof coatings</p>			

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE COLLECTION OF LETTER REPORTS ON FLEXIBLE PAVEMENT DESIGN CURVES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE June 1951		7a. TOTAL NO. OF PAGES 28
		7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-61
b. PROJECT NO.		
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>Continued study has been in progress since the adoption of the CBR design procedures, although no revisions to the design curves have been published as of March 1951. Correlation of service behavior data with the curves has been in progress from the earliest date. Separate studies since that time have been made and prepared in the form of letter reports to the Office, Chief of Engineers. These reports have been collected and published in this volume in order to make them more readily available.</p> <p>KEYWORDS: California Bearing Ratio; Documents; Flexible pavement design (Airfields)</p>		

DD FORM 1473
1 NOV 55

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SUMMARY OF INVESTIGATIONS AT THE PROPOSED CAMERI AIR BASE SITE, CAMERI, ITALY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1953	8	13
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-71	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Distribution limited to US Govt agencies only; Nov 1971; WES		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
<p>The explorations conducted by the Waterways Experiment Station evaluation team consisted of three test pits and six auger holes. These explorations were located along the center line of the proposed runway. In-place CER tests and moisture determinations were made in the test pits at the surface of the topsoil and on the underlying gravel. Mechanical analysis tests were performed on samples of both materials. The results of these tests are included on plate 2.</p>		
KEYWORDS: Field tests; Runways; Site investigation; [Cameri Air Base, Cameri, Italy]		

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
A STUDY OF MOISTURE-CONTENT DETERMINATIONS ON SELECTED SOILS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1954	7	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-73	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 041 085	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office of the Chief of Engineers, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT		
Report describes the tests performed and the results of the investigation, together with a suggested laboratory procedure for determining reliable moisture-content values on those soils that give erratic values in the standard laboratory moisture-content test.		
KEYWORDS: Test procedures; Water content determination (Soils)		

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REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Specify classification of title, body of abstract and indexing notation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE LABORATORY INVESTIGATION OF THE USE OF TAR AND TAR-RUBBER BLENDS FOR BINDERS FOR FLEXIBLE PAVEMENTS TO RESIST JET FUEL AND JET BLASTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE November 1952	7a. TOTAL NO. OF PAGES 16	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. 8. PROJECT NO. 9. 4.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-79 8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Distribution limited to US Govt agencies only; Jan 74; OCE (DAEN-MCE-D)		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office of the Chief of Engineer, Airfields Branch, Engineering Division, Military Construction
13. ABSTRACT <p>The primary purpose of the study was to check the validity of certain claims in the laboratory and, in the event the tar-rubber blends appeared promising, to establish design criteria, and to develop design test procedures for determining optimum binder contents. The current design criteria and test procedures were established for penetration-grade-asphalt hot mixes and, being entirely empirical, may be applicable to such mixes only. For this reason the establishment of new criteria and test procedures for tars and rubberized tars is necessary. Also, new design criteria must be developed for each major change in wheel contact pressures.</p> <p>KEYWORDS: Flexible pavement design (Airfields); Jet blast resistant materials; Jet fuel resistant materials; Rubberized-tar pavements</p>		

DD FORM 1473
1 NOV 55

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
ASPHALTIC CONCRETE BINDER COURSE WITH SHELL AGGREGATE, EGLIN FIELD NO. 9		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
E. C. Meredith		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1954	16	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-81	
a. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Mobile
13. ABSTRACT		
<p>A representative of the WES, at the request of the Mobile District Office, was present for the experimental field work conducted during the period 15-19 March at Eglin Field No. 9, Florida, in connection with manufacture and placement of an asphaltic concrete binder course mix containing reef shell aggregate. Trial runs both with and without inclusion of asphalt and placement of a number of small test sections had been undertaken during previous weeks, but the in-place gradation as established by laboratory mix design had not been met because of breakage of the shell aggregate in the production and laydown processes. The purpose of this paper is to record observations of the Waterways Experiment Station representative during this period.</p>		
<p>KEYWORDS: Aggregates; Asphalt mix design; Shells (Construction material); [Eglin Field No. 9, Florida]</p>		

DD FORM 1473
1 NOV 55

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
RELATIVE STRESS DISTRIBUTING EFFICIENCY OF PAVEMENT LAYERS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1954	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.	Miscellaneous Paper No. 4-84	
C.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The problem is to determine whether or not the use of a base or subbase material having a CBR greater than that required for the proper design of a pavement layer will permit a reduction in the thickness required for that layer by present design criteria. The degree of protection provided the subgrade by the covering layers should be evidenced by the amount of vertical movement or deflection of the subgrade material that occurs under load. Deflection has been measured and the results published for a number of instances in which test sections were constructed and tested. For this reason deflection data form the principal basis for this analysis.</p>		
KEYWORDS: Base courses; California Bearing Ratio tests; Pavement deflection; Stress distribution		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
INVESTIGATION OF THE PENETRATION OF ASPHALT INTO POROUS AGGREGATES AS RELATED TO AND AFFECTING THE SPECIFIC GRAVITY OF THE AGGREGATE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1954		
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-68	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>It was desired in this present study to determine how nearly this bulk-impregnated test procedure simulates the prototype from the standpoint of asphalt penetration. A study was made, by microscopic examination of cut sections, of the degree of penetration of hot asphalt into different mineral aggregates of varying degrees of porosity and void sizes under varying temperatures and conditions of mixing. These included samples from an actual pavement, samples prepared according to the bulk-impregnated specific gravity test procedure, and samples prepared according to certain other combinations of temperature of aggregate and asphalt. Reports prepared by the petrographer who made the examinations are included in this report as appendices A and B.</p>		
KEYWORDS: Aggregate tests; Bitumens; Liquid asphalt; Specific gravity; Voids		

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REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Indicate classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EFFECT OF EXHAUST OF F-100A AIRCRAFT ON AIRFIELD PAVEMENTS; SUMMARY OF RESULTS OF TESTS AT DAVIS-MONTHAN AIR FORCE BASE, ARIZONA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1954	24	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-91	
9. PROJECT NO.		
c.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 756 327	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D.C.
13. ABSTRACT		
<p>The purpose of the tests summarized herein was to determine the effect of the exhaust blast on pavements and to measure pavement temperatures during operations of the F-100A aircraft. The J57-P-7 propulsion unit of the F-100A aircraft develops considerably higher thrust than planes previously tested and is equipped with an afterburner. The types of pavement for consideration were asphaltic concrete, tar-rubber concrete (two types), and portland-cement concrete.</p>		
<p>KEYWORDS: Exhaust blast effects; Flexible pavements; Rigid pavements; [Davis-Monthan Air Force Base, Tuscon, Arizona; F-100 Aircraft]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of this, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
INVESTIGATION OF FORMULA VL AS A PROTECTIVE TREATMENT FOR ASPHALTIC-CONCRETE SURFACES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
E. C. Meredith		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1954	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-92	
9. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; January 1974; other requests for this document must be referred to Office of the Chief of Engineers HQDA (DAEN-MCE-D)		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The primary purpose of the investigation was to determine whether formula VL would provide an adequate protective seal for asphaltic-concrete pavement that is subjected to jet-fuel spillage. Other items considered were whether formula VL could withstand limited traffic in combination with fuel spillage, heavy traffic in areas not subjected to repeated fuel spillage, and jet blast.</p>		
<p>KEYWORDS: Flexible pavements; Jet fuel spillage (Pavements); Protective coatings; Seal coatings; [VL seal coat]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Complete classification of title, summary of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEYS OF SOIL-CEMENT CONSTRUCTION; REPORT NO. 1: TURNER AIR FORCE BASE, ALBANY, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
M. J. Mathews		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1954	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-93, Report No. 1	
9. PROJECT NO.		
c.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding the condition of pavement at Turner Air Force Base for use in a comprehensive study of pavement behavior under traffic. Turner Air Force Base was selected because it would furnish information for use in the portion of the behavior study devoted to soil-cement base courses.</p>		
<p>KEYWORDS: Base courses; Flexible pavement performance and evaluation (Airfields); Soil cement; [Turner Air Force Base, Albany, Georgia]</p>		

REPLACES DD FORM 107, 1 JAN 54, WHICH IS OBSOLETE

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing notation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE CONDITION SURVEYS OF SOIL-CEMENT CONSTRUCTION; REPORT NO. 2: MOODY AIR FORCE BASE, VALDOSTA, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) M. J. Mathews		
6. REPORT DATE November 1954	7a. TOTAL NO. OF PAGES 10	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-93, Report No. 2
a. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
c.		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. MONITORING MILITARY ACTIVITY Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT <p>A series of condition surveys of airfields having soil-cement construction was instigated to obtain data for a study of means of improving such materials. Moody Air Force Base was one of the fields tested in this series because its facilities would furnish information as to the behavior of soil-cement base courses under traffic.</p> <p>KEYWORDS: Base courses; Flexible pavement performance and evaluation; Soil cement; [Moody Air Force Base, Valdosta, Georgia]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EFFECT OF ADDITION OF SODIUM TETRAPHOSPHATE TO VICKSBURG LEAN CLAY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Woodley, Woodland G.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1953	2	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-95	
9. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>It was desired to make a limited investigation of the addition of sodium tetraphosphate to the lean clay found on the WES reservation from the standpoint of its effect on compacted density and on strength. Based on results shown in a previous report, initial tests were made with the addition of 0.3 per cent sodium tetraphosphate by weight of dry soil.</p>		
<p>KEYWORDS: Additives; Chemical soil stabilization; Clays; Compacted soils; [Sodium tetraphosphate]</p>		

DD FORM 1 NOV 54 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
JET-BLAST AND FUEL-SPILLAGE TESTS AT HUNTER AIR FORCE BASE, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
E. C. Meredith		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1952	9	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-98	
a. PROJECT NO.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The study is being conducted by the Savannah District. Programming of the work is being co-ordinated with the Flexible Pavement Laboratory, WES. The author of this memorandum assisted in initiating the jet-blast tests and observed tests conducted during the period 10-16 March 1952. Tests are being directed by Mr. Ben H. Cunningham, Chief of the Foundation and Materials Branch, Savannah District. Representatives of the U. S. Rubber Company, Flintkote Company, and Natural Rubber Bureau are observing the tests, since they furnished materials for and participated in construction of certain of the test sections.</p> <p>KEYWORDS: Exhaust blast effects; Jet blast resistant materials; Jet fuel resistant materials; Jet fuel spillage (Pavements); [Hunter Air Force Base, Georgia]</p>		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CONSTRUCTION INDEX		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE March 1955	7a. TOTAL NO. OF PAGES 11	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-100	
8c. PROJECT NO.		
9.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Special Engineering Branch, Engineer Research and Development Division, Troop Operations, Office, Chief of Engineers Department of the Army, Washington, D. C.	
13. ABSTRACT The objective of this study is to establish a simple index to the construction effort that is required to build airfields in theaters of operations. Such an index will provide aircraft designers with a relative concept of the airfield construction problems precipitated by proposed aircraft modifications.		
KEYWORDS: Airfield construction		

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1 NOV 55

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OBSOLETE FOR ARMY USE.

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Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE		
THE COMPUTATION OF STRESS AND STRAIN IN A TWO-LAYER SYSTEM		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE October 1954	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-102	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>This report presents the results of a study of data obtained in investigations made to determine the distribution of stress and strain in a two-layer elastic medium on which a uniform circular load was acting. The upper layer was of finite thickness and infinite extent; the lower layer was of semi-infinite thickness and infinite extent. Both layers were homogeneous and isotropic throughout.</p>		
KEYWORDS: Layered systems; Stress distribution; Stress-strain relations		

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Source Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing information must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF FORWARD AIRSTRIP CRITERIA FOR SOIL STRENGTH		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1955	21	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-104	
c.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 112 973L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; January 1974. Other requests for this document must be referred to Office, Chief of Engineers, HQDA (DAEM-MCE-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, Special Engineering Branch, Engineer Research and Development Division, Troop Operations Washington, D. C.
13. ABSTRACT		
<p>The studies reported herein constituted a part of a test program, designated Exercise Skydrop No. 1, that was initiated at the direction of Headquarters USAF for the purpose of evaluating the proposed criteria so that official criteria can be established that will provide the minimum standard airstrip facilities with the least construction effort in order that aircraft may deliver promptly heavy armament, equipment, personnel, and supplies for further development or expansion. The test program was also designed to evaluate the adequacy of airborne-droppable construction equipment.</p>		
<p>KEYWORDS: Evaluations; Expedient construction; Landing strips; Soil strength; Unsurfaced runway performance and evaluation</p>		

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DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing classification must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PLANE OPERATIONS ON UNPREPARED LANDING STRIP AT EGLIN AIR FORCE BASE, FLORIDA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1954	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper No. 4-110	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 756 112	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineer U. S. Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The purpose of the study was to evaluate the performance of a Lockheed Neptune P2V plane on unprepared landing strips. The P2V is a Navy, single-wheel-assembly (tri-cycle landing gear) plane which has been modified by the Air Force. It is equipped with 20:00 x 20 tires on the main landing gears which can be operated with an inflation pressure of about 50 psi with a gross plane load of 80,000 lb, of which 35,000 lb is carried by each main wheel. The Air Force is considering the use of this plane for one landing and take-off operation in unprepared areas. The main items being studied are minimum runway length and width requirements, minimum subgrade strength requirements, and the degree of surface roughness that can be permitted.</p>		
<p>KEYWORDS: Landing strips; Unsurfaced runway performance and evaluation; [Eglin Air Force Base, Florida; Lockheed Neptune P2V plane]</p>		

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DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and index annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		3. GROUP
3. REPORT TITLE		
ANALYTICAL STUDIES OF ORTHOTROPIC LANDING MATS FOR FORWARD AIRFIELDS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final Report		
5. AUTHOR(S) (First name, middle initial, last name)		
Pickett, Gerald		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1955	36	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
DA-22-079-eng-114	Miscellaneous Paper No. 4-113	
a. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
DA Project No. 8-69-04-004		
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Special Engineering Branch, Office, Chief of Engineers, U. S. Department of the Army Washington, D. C.
13. ABSTRACT		
<p>This research deals with the mathematical solutions for deflections of landing mats under concentrated and distributed loads and supported by an elastic solid foundation. The effects of three rigidities, longitudinal, transverse, and torsional, in reducing deflections are studied.</p>		
<p>KEYWORDS: Airfields; Deflection; Landing mats</p>		

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DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
TESTS ON AN ABSORPTIVE AGGREGATE TO STUDY EFFECT OF ABSORPTION AND GRADATION ON VOIDS IN COMPACTED BITUMINOUS PAVING MIX			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
John L. McRae			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
February 1955	5		
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)		
	Miscellaneous Paper No. 4-118		
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.	
13. ABSTRACT			
<p>The Indiana mix typified two current mix design problems: (a) high porosity and its related problems of proper specific gravity and voids; and (b) effect of gradation on voids. It appeared desirable to procure samples of this material and conduct limited tests as a part of the bituminous mix design research work. The aggregates were provided by Professor Woods, and the tests were conducted in October 1953.</p>			
KEYWORDS: Aggregate gradation; Aggregate tests; Asphalt mix design; Bitumens; Voids			

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and in-text annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		2b. GROUP
PROCEDURES FOR ESTABLISHING FAMILY OF VOIDS CURVES FOR HOT-MIX BITUMINOUS PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
John L. McRae		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1955	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-121	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>This paper presents two procedures for preparing families of voids curves. In the first procedure curves of constant values for both per cent voids total mix (air voids) and per cent voids filled with bitumen are overlaid on the usual unit weight versus asphalt content plot. In the second procedure, curves are calculated entirely on a volumetric basis.</p>		
KEYWORDS: Asphalt mix design; Bitumens; Hot mix; Voids		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and in-text annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SUMMARY REVIEW OF LIGNIN AND CHROME-LIGNIN PROCESSES FOR SOIL STABILIZATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
George R. Kozan		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1955	11	8
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
a. PROJECT NO. 8-70-03-002		Miscellaneous Paper No. 3-122
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The purpose of this review is to summarize briefly the investigations to date of lignin and chrome-lignin processes for soil stabilization. Although many earlier studies are summarized herein as background material, the primary basis for this review was the extensive research conducted by Cornell University under Engineer Research and Development Laboratories contract. The capabilities and limitations of lignin agents as well as major equipment deficiencies are discussed. Suggestions for further work, both in the laboratory and in the field, are offered.</p>		
KEYWORDS: Chemical soil stabilization		

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Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES; REPORT NO. 2, CALCIUM ACRYLATE TREATMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
James K. Mitchell		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1956	11	9
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 8-70-03-107	Miscellaneous Paper No. 3-122, Report No. 2	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 085 062	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Calcium acrylate monomer when added to a soil in the presence of water and an appropriate catalyst polymerizes, holding the soil grains in a cross-linked network of bonds. Data show that good stabilization can be achieved by this process on a wide range of soils. A soil stabilized in this manner is weakest and most flexible at high water contents. Large-scale tests indicate that the limitations of presently available construction equipment reduce the effectiveness of the chemical in field treatment. However, the results are considered sufficiently promising to warrant further study of stabilizers of this type.</p>		
KEYWORDS: Chemical soil stabilization		

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1 NOV 66

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Security Classification

Unclassified

2. SECURITY CLASSIFICATION

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES; REPORT NO. 3, SOIL-CEMENT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
James K. Mitchell			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
September 1956	33	60	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO. E-70-03-107	Miscellaneous Paper No. 3-122, Report No. 3		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.	AD 107 687		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT			
<p>The properties, uses, construction procedures, design, and field performance of soil-cement, as reported by several agencies in the United States and in Great Britain, have been reviewed and the field performance evaluated in this report.</p>			
<p>KEYWORDS: Cement soil stabilization</p>			

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES; REPORT NO. 4, BITUMINOUS TREATMENT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) James K. Mitchell			
6. REPORT DATE November 1956		7a. TOTAL NO. OF PAGES 19	7b. NO. OF REFS 34
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 3-122, Report No. 4	
a. PROJECT NO. 8-70-03-107		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 113 306	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT The purpose of this review is to summarize briefly the development of and current practices in stabilizing soils with bituminous materials. This review is based on the extensive literature available on soil-bitumen. KEYWORDS: Bituminous soil stabilization			

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Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2c. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES; REPORT NO. 5, HYDRATED LIME AND QUICKLIME		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Dean R. Freitag J. D. Decker		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1957	17	36
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 8-70-03-107	Miscellaneous Paper No. 3-122, Report No. 5	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The purpose of this review is to summarize existing knowledge of the theory and practice of lime-soil stabilization and thereby to assess the potentialities of lime for military soil stabilization purposes. The information presented has been obtained from available literature and consequently represents a composite of the thinking of a number of investigators. In instances where apparently divergent views are held, both sides of the case are stated with no attempt made to resolve the differences.</p>		
KEYWORDS: Lime soil stabilization		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexes annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES; REPORT 6, MIXING PRINCIPLES, TECHNIQUES, AND EQUIPMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
George R. Kozan John D. Stouffer		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1961	33	40
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
A. PROJECT NO. 8S70-05-001		Miscellaneous Paper No. 3-122, Report 6
C. Task 05		9b. OTHER REPORT NO.(S) (Any other numbers that may be assigned this report)
		AD 653 583
10. DISTRIBUTION STATEMENT		
Approved for public release, distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The purpose of this report is to summarize the current status of mixing and mixer development, particularly the aspects of the principles employed that may lead to more efficient designs and techniques for incorporating potential stabilizers in wet, fine-grained soils. The report points out the advantages and limitations of presently available items of equipment, discusses factors contributing to the efficiency of mixing, and presents the findings of laboratory mixing investigations. It is hoped that the report will stimulate the development of a mixing apparatus or concept that will improve the soil-stabilization construction potential of the military forces, particularly in weak, clay-type soils.</p>		
KEYWORDS: Soil mixers; Soil stabilization		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SUMMARY REVIEWS OF SOIL STABILIZATION PROCESSES; REPORT 7, ELECTRICAL STABILIZATION OF FINE-GRAINED SOILS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
George R. Kozan William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1961	29	53
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 8S70-05-001	Miscellaneous Paper No. 3-122, Report 7	
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>The intent of this review is to summarize available information published in the technical literature concerned with the influence of an electrical current on soil properties, and to determine the practicability of electrical methods of soil stabilization in military operations, such as their possible application in stabilizing emergency military roads and airfields. It is hoped that this review will serve both to guide and to stimulate further investigations.</p>		
KEYWORDS: Electrokinetic soil stabilization		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing notation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE FIELD COMPACTION TESTS WITH IMPACT COMPACTOR			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Barton G. Schreiner			
6. REPORT DATE May 1955		7a. TOTAL NO. OF PAGES 11	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-127	
b. PROJECT NO.		9a. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT This report presents the results of field tests of a new type of compaction apparatus designated the impact compactor. The tests were made on lean clay soil for which compaction data obtained in previous studies with rubber-tired and sheepfoot rollers are available. The purpose of the study was to observe the behavior of the impact compactor and determine its effectiveness in producing high densities and strengths in the lean clay soil. The study consisted of (a) construction of 11 test lanes, using three different models of the compactor, (b) testing of the compacted material for water content, density, and in-place CBR, and (c) comparison of the compaction and CBR data developed with the impact compactor with laboratory data and field data developed with other types of compacting equipment. KEYWORDS: Compaction equipment; Impact compaction			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PRESENT STATUS OF SOIL STABILIZATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1954	8	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. 4-129	
c.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Discusses the uses and limitations of the two most widely used conventional stabilizers, bitumen and portland cement, and the two most promising chemical stabilizers studied by the Army, chrome-lignin and calcium-acrylate. Finally, a brief discussion is presented covering the more promising trends of present and future developmental work.</p>		
KEYWORDS: Soil stabilization; State-of-the-art studies		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		1a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PRESENT STATUS OF STUDIES RELATED TO AIRHEAD CONSTRUCTION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1954	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO. 8-69-04-004	Miscellaneous Paper No. 4-130	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>Studies conducted by the Waterways Experiment Station under Project No. 8-69-04-004, Criteria for Designing Runways Surfaced with Landing Mat, and other studies assigned to the Waterways Experiment Station and to the Ohio River Division Laboratories are producing information pertinent to the construction of an airhead. These studies are discussed under the following subjects: (a) Criteria for runways surfaced with landing mats; (b) Criteria for unsurfaced runways; (c) Skydrop No. 1, Camp Campbell; (d) Ready reference handbook on airhead construction; (e) Eglin Field; (f) Construction index.</p>		
<p>KEYWORDS: Airfield construction; Landing mat construction; Unsurfaced airfields; [Camp Campbell, Clarksville, Tenn.; Eglin Field, Valpariso, Fla.]</p>		

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Unclassified

Security Classification

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DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
TEST OF CONGERCOTE AS A JET-FUEL-RESISTANT COATING		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1955	5	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-134	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The tests described herein were authorized by the Office, Chief of Engineers, in letter dated 14 September 1954, subject "Jet-Fuel Resistant Coating," to determine the suitability of Congercote as a protective seal for asphaltic-concrete pavements subjected to jet-fuel spillage. The material was first called "Weathercote" but its name was changed by the manufacturer, M. Weaver Company of Cincinnati, Ohio, to "Congercote." Tests were also conducted on this material to determine the effects of high-pressure-tire traffic both inside and outside the fuel-spillage areas.</p>		
KEYWORDS: Jet.fuel spillage (Pavements); Protective coatings; Seal coats		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE INVESTIGATION OF SHELL AND SAND-SHELL MIXES FOR BASE COURSES		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Vedros, Philip J.			
6. REPORT DATE July 1955	7a. TOTAL NO. OF PAGES 10	7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-136		
8c. PROJECT NO.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 084 818		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.	
13. ABSTRACT A review was made of results of (a) laboratory tests made by the South Atlantic Division Laboratories (SADL) in connection with design problems at Eglin Air Force Base, Florida, and Brookley Air Force Base, Alabama, (b) field and laboratory tests made by the Waterways Experiment Station (WES) on a test section constructed by the Navy at Pensacola Naval Air Station, Florida, and (c) field and laboratory tests made by the WES at Keesler Air Force Base, Biloxi, Mississippi, in connection with a study of moisture content under pavements. In addition, a limited series of laboratory tests was conducted to supplement the field and laboratory data mentioned above. The results of the review and the limited series of laboratory tests are presented in this report. KEYWORDS: Base courses; Sands; Shells (Construction material); [Brookley AFB, Ala.; Eglin AFB, Fla.; Keesler Air Force Base, Biloxi, Miss.; Pensacola Naval Air Station, Fla.]			

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REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing notation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
OPERATIONAL SUITABILITY TEST OF MOBILE MATERIALS LABORATORY M-2		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Richard H. Groves		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1956	14	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 8-70-03-108	Miscellaneous Paper No. 3-138	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The mobile materials laboratory M-2 is a self-contained soils, bituminous, and concrete testing laboratory mounted within an insulated semitrailer van which can be towed by a 5-ton or larger truck-tractor. The van contains a 10-kw engine generator, an air-conditioning unit, and a heating unit. The laboratory without dolly weighs 26,640 lb; the dolly weighs 2,600 lb. The objective of this test is to determine the operational suitability of the mobile materials laboratory. The test will encompass the following: (a) Phase I, transportability, mobility, and maneuverability; (b) Phase II, adequacy of testing equipment; (c) Phase III, adequacy of van design and accessory equipment; (d) Phase IV, adequacy of field reconnaissance kits; (e) Phase V, adequacy of electronic interval timer.</p>		
KEYWORDS: Field laboratories		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate name)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
FUEL-SPILLAGE TESTS ON TAR-RUBBER PAVING, HOMESTEAD AIR FORCE BASE, FLORIDA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1955		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
DA-08-123-eng-1591 and DA-08-123-eng-1624	Miscellaneous Paper No. 4-142	
9. PROJECT NO.		
	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Department of the Army Office, Chief of Engineers Washington, D. C.
13. ABSTRACT		
<p>Placement of the wearing surface on the southwest end of the runway was begun on the morning of 2 May 1955. At the beginning of paving operations, the surface texture was comparatively rough and mat density lacked uniformity. As a result of several conferences of representatives of the Office, Chief of Engineers, South Atlantic Division, Jacksonville District, and the Waterways Experiment Station some changes in adjustments of the spreader and in the method of rolling, and slight variations in gradation were made which improved both the surface texture and mat density. These changes are discussed in detail in appendix A.</p>		
<p>KEYWORDS: Jet fuel spillage (Pavements); Rubberized-tar pavements; [Homestead Air Force Base, Florida]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
REPORT OF TRIP TO SAVANNAH DISTRICT AND HUNTER, PINECASTLE, AND MACDILL AIR FORCE BASES IN CONNECTION WITH DRAINPIPE STUDY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Donald N. Brown		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1955	11	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-144	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; Distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The trip was made for the following reasons: (a) To discuss an analysis of excessive deflection observed in a 54-in., 12-gage corrugated metal drainpipe; (b) To inspect the special pipe installation at Hunter AFB; (c) To make a general condition survey of drainpipe buried beneath airfield pavements; (d) To make a general condition survey of airfield pavements over and in the vicinity of buried drainpipes; (e) To determine if there is any evidence that live load deflection of flexible corrugated metal pipe beneath flexible airfield pavement is causing deformation of the flexible pavement; (f) To locate a site for future loading tests where simultaneous measurements of the live load deflection of corrugated metal pipe and flexible pavement could be made under B-47 aircraft loads.</p>		
<p>KEYWORDS: Airfield drainage; Drainage pipes; Pavement deflection; [Hunter Air Force Base; MacDill Air Force Base; Pinecastle Air Force Base]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
PRELIMINARY INVESTIGATION OF CHROME-LIGNIN AS A STABILIZING AGENT IN VICKSBURG LOESS SOIL		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
George R. Kozan		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1955	4	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
8. PROJECT NO. 8-70-03-002	Miscellaneous Paper No. 3-145	
9.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>Report describes a preliminary laboratory investigation to determine the suitability of chrome-lignin as a stabilizing agent for Vicksburg loess soil. Since the chrome-lignin used in this study had been stored at Ft. Belvoir, Va., for a long period of time and required grinding prior to use, the "potency" or stabilizing capacity of the chemical was subject to question. Consequently, this investigation was limited primarily to evaluation of the chemical quality of the stabilizing agent prior to the performance of more extensive laboratory studies.</p>		
KEYWORDS: Chemical soil stabilization; Loess		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
A QUATERNARY AMMONIUM SALT AS A STABILIZING AGENT IN VICKSBURG LOESS SOIL		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
George R. Kozan		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1956	12	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
8. PROJECT NO. 8-70-03-107	Miscellaneous Paper No. 3-151	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Recent studies of the effects of large organic cations on altering certain physical properties of soil have indicated the potentialities of these compounds as soil stabilizing agents. This investigation was conducted to gain further information on the suitability of such additives for use by the Corps of Engineers. Laboratory tests were made of Vicksburg loess soil treated with various amounts of a quaternary ammonium salt to determine moisture adsorption, density, and strength of the treated specimens. Test results showed that the air-dried strength of the treated soil was significantly less than that of the untreated soil; however, the wet strength, water absorption, swelling, shrinkage, and slaking characteristics were improved. An optimum admixture for maximum effectiveness of the additive was found. The necessity for appreciable drying of the treated soil before any improvement in soil stabilization is effected precludes the use of this admixture in the field. However, the improvement realized in many soil characteristics suggests that further investigation of fatty quaternary ammonium compounds of this type as soil stabilizers might be desirable.</p>		
KEYWORDS: Chemical soil stabilization; Loess		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
COOPERATIVE STUDY OF BULK IMPREGNATED SPECIFIC GRAVITY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE		
February 1956		7a. TOTAL NO. OF PAGES
		10
7b. NO. OF REFS		
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
A. PROJECT NO.		Miscellaneous Paper No. 4-152
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The cooperative study reported herein is a report on the study of the problem of specific gravity of aggregates for bituminous pavements that the Corps of Engineers has been engaged in for several years. Some of the previous results are included in this report for background information, but this paper is mainly concerned with the cooperative tests engaged in by the Flexible Pavement Laboratory and nine district and division laboratories for the purpose of evaluating the proposed test procedure that had already been established and making any modifications that appeared necessary as a result of the cooperative tests. From these tests, it appeared that the simplest and best procedure to use as standard for the test would specify 85-100 penetration asphalt for the test fluid without regard to source, and 2-min hand stirring, eliminating the external vibration which is now permitted. It appeared that duplicate determinations should check with 0.04.</p>		
KEYWORDS: Aggregate tests; Asphalt mix design; Bitumens; Flexible pavement design (Airfields); Specific gravity; Voids		

DD FORM 1473

NOV 66

REPLACES DD FORM 1473, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE SPECIFIC GRAVITY AND VOIDS RELATIONSHIPS IN BITUMINOUS PAVEMENT MIX DESIGN		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) John L. McRae		
6. REPORT DATE March 1956	7a. TOTAL NO. OF PAGES 7	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-162	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>This paper discusses the basic problem of specific gravity of aggregates for use in calculating voids in bituminous mixes, the application of the calculated voids data, and a new approach in bituminous pavement design being developed by the Flexible Pavement Laboratory, Soils Division, of the Waterways Experiment Station which may eliminate the necessity for voids calculations.</p> <p>KEYWORDS: Aggregate tests; Asphalt mix design; Bitumens; Flexible pavement design (Airfields); Specific gravity; Voids</p>		

DD FORM 1 NOV 55 1473 REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of this, title of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
WEATHERING TESTS ON BITUMINOUS PAVEMENT SAMPLES; REPORT NO. 1, OBSERVATIONS OF EFFECTS THROUGH 1954		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1956	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-170, Report No. 1	
9. PROJECT NO.		
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT		
<p>Visual observations have been recorded on specimens of bituminous pavements exposed to the weather at the Waterways Experiment Station for periods of four months to eight years. The effects of weathering on durability of pavement specimens, in which composition or certain elements in the specimen preparation procedures were varied, were observed. The following were studied as to their effect on the specimens: (a) varying penetration of asphalt, (b) varying crudes from which the asphalts were refined, (c) method of refining asphalts, (d) aggregate gradation, (e) compaction, (f) asphalt content, (g) compaction temperature, (h) type of bitumen, and (i) type and quantity of filler. Cracking of the specimens has been the most prevalent effect of weathering and aging. In some instances, the specimens have deformed because of cold flow and lack of lateral support. Spalling and erosion have occurred on specimens aged for long periods. There is evidence that certain properties such as bitumen content, gradation of aggregate, and compaction effort are related to durability of pavements; however, it is not believed that the weathering data included in this report are exhaustive enough to warrant final conclusions at this time.</p> <p>KEYWORDS: Flexible pavements; Pavement deterioration; Weathering effects</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

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DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
WEATHERING TESTS ON BITUMINOUS PAVEMENT SAMPLES; REPORT 2, OBSERVATIONS OF EFFECTS THROUGH NOVEMBER 1959		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Audley A. Maxwell John L. McRae William H. Larson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1962	26	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-170, Report 2	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 294	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Report No. 1 of this series, dated May 1956, contained data on specimens subjected to as much as eight years of weathering. Since that report was published, additional specimens have been included in the test program. This report, which describes results obtained to November 1959, covers those specimens previously reported which are believed to provide additional useful information, as well as specimens added since the first report.</p>		
KEYWORDS: Flexible pavements; Pavement deterioration; Weathering effects		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

AD-A045 025

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG--ETC F/G 1/5
A BIBLIOGRAPHY WITH ABSTRACTS OF U.S. ARMY ENGINEER WATERWAYS E--ETC(U)
AUG 77 M P MEYER, V DALE
PSTIAC-5-VOL-2-PT-1

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2 OF 5
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A045025



DOCUMENT CONTROL DATA - R & D		
<small>When a classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		29. REPORT SECURITY CLASSIFICATION Unclassified
		28. GROUP
3. REPORT TITLE LABORATORY REPORT OF TESTS ON HARMON AIR FORCE BASE ASPHALT AND ASPHALT PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE June 1956	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-172	
a. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>These tests have indicated a very serious deficiency in density of this pavement which could alone cause failure through surface deterioration if moisture and dirt were present during traffic. Water was found in the asphalt from the contractor's storage tank; if this contamination was present, possibly caused by a leaking steam coil, then it would definitely contribute toward stripping and surface deterioration. There is some evidence of overheating of the aggregate. It is recommended that steps be taken to insure use of proper equipment for heating the asphalt and proper control of aggregate-drying operation. It is further recommended that steps be taken to insure obtaining adequate density in the pavement. If these steps are taken, these materials should make a satisfactory pavement.</p>		
KEYWORDS: Asphalt deterioration; Flexible pavement performance and evaluation (Airfields); [Harmon Air Force Base, Stephenville, Newfoundland, Canada]		

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Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE MOISTURE CONDITIONS UNDER FLEXIBLE AIRFIELD PAVEMENTS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) John F. Redus Charles R. Foster			
6. REPORT DATE June 1956		7a. TOTAL NO. OF PAGES 20	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-175	
a. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES Reprinted from American Society of Civil Engineers, Proc. Vol. 83, Journal of the Soil Mechanics and Foundations Division, No. SMI, Jan. 1957, Paper No. 1159		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT Investigation of conditions under pavements on 13 airfields over period of several years indicates that base course and subgrade moisture contents become stabilized after about 2 yr.; moisture contents in upper 18 in. were not found to be related to rainfall, contrary to those at 30 in.; CBR design procedures are conservative for nonplastic, but about right for plastic materials. KEYWORDS: Base courses; Flexible pavements; Soil moisture; Subgrades			

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified</small>		
1. SPONSORING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE REVIEW OF MATERIALS AND METHODS FOR DUSTPROOFING AND WATERPROOFING SOILS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) George R. Kozan		
6. REPORT DATE July 1956	7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS 42
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 3-176	
8b. PROJECT NO. E-70-03-106	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 105 203	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT A summary review of investigations of materials proposed for dustproofing and waterproofing soils conducted by the Corps of Engineers and other agencies to date and is intended to provide background information for the establishment of a dustproofing and waterproofing development program at the Waterways Experiment Station.		
KEYWORDS: Dust control; Materials; Waterproofing (Soils)		

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DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE LABORATORY INVESTIGATION OF USE OF VOLCANIC CINDERS FOR BITUMINOUS PAVING FOR LAJES AIR FORCE BASE, AZORES			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
6. REPORT DATE July 1956		7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-179	
a. PROJECT NO.			
c.		8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT It was requested that complete acceptance tests be performed, particularly with regard to inherent structural strength of cinders, and, if acceptable, a wearing course mix design for 200-psi tires, jet aircraft, be established. Tests were conducted and test results are tabulated. In view of the failure to pass the stripping test and the great loss in stability in the immersion-compression test, the cinder aggregates, are classed as showing serious stripping. If the stripping was less serious, it might be possible to use an antistrip agent and correct the deficiency. However, considering the extreme stripping tendency coupled with the tendency to break down under compaction stresses and the tendency to swell, it is recommended that the cinders not be used. KEYWORDS: Acceptance tests; Aggregate tests; Cinders; [Lajes Air Force Base, Terceira, Azores]			

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DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE A STUDY OF THE EFFECTS OF H-21 HELICOPTER OPERATIONS ON FLEXIBLE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) W. K. Kastner		
6. REPORT DATE August 1956	7a. TOTAL NO. OF PAGES 9	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-180	
9. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Military Construction Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT The investigation of the effect on flexible pavements of helicopter operations was undertaken as part of a general study to establish design requirements for flexible pavements to be used by Army aircraft. At the time of initiation of the general study severe damage was being inflicted on flexible pavements by one particular helicopter, the H-21. Various sites where this damage had been noted were investigated by representatives of the Waterways Experiment Station. The unique nature of the damage, its causes, and recommendations for its control are presented herein.		
KEYWORDS: Flexible pavement failures (Airfields); Helicopters; Landing gear; [H-21 helicopter]		

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Source: Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		10a. REPORT SECURITY CLASSIFICATION Unclassified 10b. GROUP
2. REPORT TITLE EXPERIMENTS IN DESTABILIZING SOILS WITH CHEMICALS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) A. B. Thompson		
6. REPORT DATE November 1956	7a. TOTAL NO. OF PAGES 19	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. 8b. PROJECT NO. 8c. 8d.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-186 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD A006 525L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; Jan 1974; HQDA (DAEN-MCE-D)		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers Department of the Army Washington, D. C.
13. ABSTRACT <p>The tests described herein were conducted to determine the effectiveness of bentonite as an agent for reducing the usefulness of airfield and roadway surfaces. Small-scale pilot tests were conducted on flexible pavement and turf to develop methods of applying the bentonite, to select the type of granulated bentonite best suited for the purpose, and to determine quantities to be used in full-scale tests. Laboratory tests were then performed on blends of bentonite and deliquescent materials to determine the ability of the mixture to absorb moisture from the air and become plastic; however, not enough moisture was absorbed to produce stickiness. Mixtures of a lean-clay soil and bentonite were also tested and it was found that the bentonite admixture increased the plasticity index of the soil. For the full-scale tests, existing surfaces of flexible pavement, bare soil, and turf were treated with varying quantities of granulated bentonite. The material was moistened and its effect on movement of vehicles was determined by traffic and skid tests. The tests showed that bentonite, applied as thickly as considered reasonably possible for a large area, will not destabilize flexible pavement, bare soil, or turf sufficiently to immobilize a light tank, a 2-1/2-ton truck, or a 1/2-ton truck. Limited tests made of Aqua Gel produced the same results. Removal or neutralization of the bentonite was attempted by different methods, and washing or shoveling was found to effectively remove the chemical.</p> <p>KEYWORDS: Clays; Soil destabilization</p>		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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DOCUMENT CONTROL DATA - R & D		
<small>(Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE FIELD COMPACTION TESTS WITH JAY (MODEL J-12) PLATE-TYPE VIBRATORY COMPACTOR		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Hansen, Raymond		
6. REPORT DATE December 1956	7a. TOTAL NO. OF PAGES 13	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-190	
a. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>Report presents the results of field tests performed with the Jay (model J-12) plate-type vibratory compactor. The purpose of the tests was to observe the behavior of the plate-type vibratory compactor with reference to handling ease and performance and to evaluate its effectiveness in producing high densities in soils and pavements compared to that of compaction equipment currently in use. The tests were made on five different types of soils, ranging from plastic to nonplastic, for which laboratory compaction data were available from previous studies, and on one hot-mix paving mixture. The study consisted of (a) backfilling and compacting four test pits, utilizing the different types of soil; (b) compacting a surface patch of hot-mix bituminous pavement; and (c) testing all compacted materials for degree of compaction obtained.</p> <p>KEYWORDS: Compaction (Soils); Vibratory compactors; [J-12 vibratory compactor]</p>		

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Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE A STUDY OF IN-PLACE DENSITY DETERMINATIONS FOR BASE COURSES AND SOILS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) John F. Redus			
6. REPORT DATE January 1957		7a. TOTAL NO. OF PAGES 12	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-197	
a. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT A study was undertaken at the Waterways Experiment Station to determine the amount of error inherent in certain apparatus and methods in general use and to examine the technique for using them in the field. This paper describes the methods used to evaluate the apparatus and test procedures and presents the results of the evaluations.			
KEYWORDS: Base courses; Soil density measuring devices; Unit weight determination			

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REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE STUDY OF NUCLEAR PROBES FOR DETERMINATION OF AIRFIELD DENSITIES AND MOISTURES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) W. R. Beckett Barton G. Schreiner		
6. REPORT DATE March 1957	7a. TOTAL NO. OF PAGES 19	7b. NO. OF REFS 4
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-199	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT During this study, calibration curves were developed based on laboratory and field data relating count ratios determined by the nuclear probes to per cent moisture (volume basis) and wet density. The effective radius or height (above the radiation source) of the influence bulb measured by the nuclear method in a given soil was found to be in the order of 7 to 9 in. which is too large for effective use for airfield construction control or evaluation studies. In addition, the nuclear method of measurement of soil density and moisture was found to be not as accurate or reliable as direct sampling procedures. This investigation showed, however, that the nuclear probe method of measurement does have inherent characteristics that would be useful for studies of airfield densities and moisture if the probes can be modified to accurately measure relatively thin soil layers (6 in. or less in depth) and if the instrumentation can be improved so as to make the equipment more durable and reliable. KEYWORDS: Airfields; Nuclear methods; Unit weight determination; Water content determination (Soils)		

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NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EFFECTS OF H-21 HELICOPTER LANDING GEAR LOADINGS ON FLEXIBLE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1957	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-202	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO. 31 (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The severity of the loading imposed on landing facilities by the H-21 helicopter has been the subject of a number of studies during the past year. A side thrust of the main gear that occurs during touchdown on vertical landings produces the damaging loading peculiar to the H-21 helicopter. Results of the first series of investigations were reported in WES Miscellaneous Paper 4-180, <u>A Study of the Effects of H-21 Helicopter Operations on Flexible Pavements</u>, dated August 1956. During October 1956, additional observations and tests using the H-21 helicopter were performed at WES to obtain data on the effect of helicopter loadings on flexible pavements. This is a part of a general study to establish design requirements for flexible pavements to be used by Army aircraft.</p>		
KEYWORDS: Flexible pavement failures (Airfields); Helicopters; Landing gear; [H-21 helicopter]		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
TESTS ON ASPHALT PAVING FOR FROBISHER, N. W. T.		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1957	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper No. 4-207	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Visual observation indicated a nonuniform distribution of bitumen throughout the pavement. This was evidenced by lean and rich spots. There appeared to be an excess of prime coat material and an excessive accumulation of bitumen in the surface of the pavement which could not be clearly identified as a normal seal coat. In general, the pavement contained an excess of bitumen.</p>		
<p>KEYWORDS: Bitumens; Flexible pavement performance and evaluation (Airfields); [Frobisher, N. W. T., Canada]</p>		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing) information must be entered when the overall report is classified		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEYS OF PAVEMENTS SUBJECTED TO CHANNELIZED TRAFFIC; REPORT 1, DAVIS-MONTHAN AFB, TUCSON, ARIZONA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Carlton L. Rone		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1957	17	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-213, Report 1	
9. PROJECT NO.		
	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 295	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding pavement conditions at Davis-Monthan Air Force Base. These investigations are part of a series of studies to determine the effect of channelized traffic on the various elements of flexible pavements. Davis-Monthan AFB was included in these investigations because taxiway 14 had shown signs of distress along the channelized traffic lane.</p>		
<p>KEYWORDS: Airport runways; Channelized traffic tests; Flexible pavement performance and evaluation (Airfields); [Davis-Monthan Air Force Base, Tucson, Arizona]</p>		

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REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Examine classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEYS OF PAVEMENTS SUBJECTED TO CHANNELIZED TRAFFIC; REPORT 2, MARCH AIR FORCE BASE, RIVERSIDE, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1958	11	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-213, Report 2	
9. PROJECT NO.		
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 756 296	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of field and laboratory investigations conducted to obtain data regarding pavement conditions on taxiway 3 (designated taxiway 11 prior to 1955) at March Air Force Base. These investigations were made in connection with a series of investigations of the effects of channelized traffic on various flexible pavement elements. March AFB was included in this series because the pavements there had been subjected to channelized traffic and taxiway 3 had shown signs of distress along the channelized traffic lane.</p>		
<p>KEYWORDS: Airport runways; Channelized traffic tests; Flexible pavement performance and evaluation (Airfields); [March Air Force Base, Riverside, California].</p>		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>2.3. unless classification of title, body of abstract and indexing annotation must be entered when the overall report is classified</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CONDITION SURVEYS OF PAVEMENTS SUBJECTED TO CHANNELIZED TRAFFIC; REPORT 3, MCCOY AIR FORCE BASE, ORLANDO, FLORIDA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) W. E. Buchanan		
6. REPORT DATE November 1958	7a. TOTAL NO. OF PAGES 20	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-213, Report 3	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 756 297	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>A condition survey of McCoy Air Force Base, Orlando, Fla., was included in the long-range study of the effects of channelized traffic on the various elements of flexible pavements because channelized traffic had occurred at this field, and distress was apparent on taxiway 5 and the east N-S runway. The surfaces of all facilities were inspected with special emphasis on the distressed runway and taxiway. Field testing and sampling were performed in test pits at five locations on taxiway 5 and seven locations on the east N-S runway in or adjacent to distressed areas. Samples of the pavement, base, subbase, and subgrade were also tested in the laboratory. Tests and observations indicated that the quality of the pavement mixes and the base course material and the strength of the subgrade and subsoil were adequate for the traffic imposed. The quality of the subbase material on the runway was adequate, but the subbase material on taxiway 5 was weak in localized areas, probably because "muck" had been incorporated in the sand as a stabilizer. The compaction produced in the various layers appeared to be adequate for the traffic imposed where normal compaction had been applied. Apparently normal rolling was not applied along the center line of the taxiway, nor on the center line of the runway at even stations, and depressions occurred under traffic.</p> <p>KEYWORDS: Airport runways; Channelized traffic tests; Flexible pavement performance and evaluation (Airfields); [McCoy Air Force Base, Orlando, Florida]</p>		

DD FORM 1373

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R 1.0		
<small>The classification of this body of abstract and indexing information must be entered when the report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
		3. GROUP
4. REPORT TITLE CONDITION SURVEYS OF PAVEMENTS SUBJECTED TO CHANNELIZED TRAFFIC; REPORT 4, WALKER AIR FORCE BASE, ROSWELL, NEW MEXICO		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name) W. E. Buchanan		
7. REPORT DATE December 1959	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-213, Report 4	
9. PROJECT NO.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.	11. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
12. SUPPLEMENTARY NOTES		
13. ABSTRACT <p>Two condition surveys at Walker Air Force Base (in 1954 and 1957) were included in the long-range study of the effects of channelized traffic on the various elements of flexible pavements because channelized traffic had occurred at this field, and distress was apparent on the NE-SW runway, the NW-SE runway-apron, taxiway 5A, taxiway 9, taxiway 6, taxiway 1, and the NW main apron. The surfaces of all facilities were inspected, with special emphasis on the distressed areas. Field testing and sampling during the 1954 investigation were performed in three test pits on the NW-SE runway-apron and one test pit on taxiway 5A. Field testing and sampling during the 1957 investigation were performed in one test trench and three test pits on taxiway 9, three pits on taxiway 1, two pits on the NE-SW runway, and two pits on the NW main apron. Samples of the pavement, base, subbase, and subgrade were also tested in the laboratory.</p> <p>KEYWORDS: Airport runways; Channelized traffic tests; Flexible pavement performance and evaluation (Airfields); [Walker Air Force Base, Roswell, New Mexico]</p>		

DD FORM 173

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R E D		
<small>Classification of this, title of abstract and subject annotation must be entered when the report is classified.</small>		
1. SPONSORING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE LABORATORY TESTS ON AGGREGATE AND PRELIMINARY BITUMINOUS MIX FOR SONDRESTROMFJORD, GREENLAND		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(s) (First name, middle initial, last name) Thomas B. Kennedy		
6. REPORT DATE April 1957	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-216	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>Tests were conducted to determine crushing, abrasion, and soundness characteristics and mineral content. A report of these tests is given in a memorandum from the Chief of the Concrete Research Division to the Chief of the Bituminous and Chemical Section (inclosure 2). The aggregate was satisfactory in all of the tests; however, as pointed out in the report, its durability with regard to freezing and thawing was not determined.</p>		
KEYWORDS: Aggregate tests; Asphalt mix design; [Sondrestromfjord, Greenland]		

DD FORM 1-73

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. Sponsoring Agency (Department, office, or activity)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
RELATIONSHIP BETWEEN TIRE PRESSURE AND MARGINAL-ROAD DETERIORATION, PILOT TESTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(s) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1957	12	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-220	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Pilot tests conducted on typical sections of graded earth roads and roads surfaced with gravelly material using the M51 dump truck were concerned with the determination of relationship between tire pressure, tire-tread wear, and road deterioration at constant axle load. The tests demonstrated that deterioration of the roadways varied with the tire contact pressure, the contact area, and the soil strength. There were definite indications of relationships between these elements which at present are not known and which warrant further investigation. The limited amount of traffic in these tests did not produce a measurable amount of tire wear, therefore it was not possible to obtain an indication of the economic relationship existing between vehicle operation over low-type roads with tires at low pressure or operation with tires at pressures designed for hard pavements.</p>		
<p>KEYWORDS: Pavement deterioration; Soil-tire interaction; Tire-pavement interaction; Traffic tests; Unsurfaced roads</p>		

DD FORM 1-75

REPLACES DD FORM 147, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. SPONSORING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
POSSIBLE AUXILIARY USES OF EXTRUDED T-11 ALUMINUM AND T-8 MAGNESIUM LANDING MATS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR (First name, middle initial, last name)		
D. M. McCain		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1957	88	33
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
DA-22-079-eng-205	Miscellaneous Paper No. 4-221	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 303	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>A casual observation by a structural engineer of the multiple bulb tee section designed for landing mats -- the T-11 Aluminum and the T-8 Magnesium -- results in a preliminary conclusion that the sections are adaptable for other structural uses. This study analyses the sections, determines their load carrying capacities and deflection characteristics under the various load conditions expected in quite general cases, and shows specific instances where the data so obtained may be directly applied in auxiliary uses. Quantitative values obtained in the study support the conclusion mentioned above. Fabrication, erection, and cost considerations are weighed. Modifications are specified in the instances where they are needed.</p>		
<p>KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Magnesium landing mats; [T8 landing mat; T11 landing mat]</p>		

DA-22-079

REPLACES DA FORM 147, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATOR'S NAME (Type of report and inclusive dates)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
EFFECTS OF JET BLAST AND FUEL SPILLAGE ON BITUMINOUS PAVEMENTS		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
Willard J. Turnbull Charles R. Foster		
7. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1957	14	4
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-225	
10. PROJECT NO.	11. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
12. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
13. SUPPLEMENTARY NOTES		14. SPONSORING MILITARY ACTIVITY
15. ABSTRACT		
<p>The hot gases that impinge on the pavement, and the fuel that is spilled on the pavement during ground operations of jet aircraft have created problems for the pavement designer that were not encountered with propeller-driven aircraft. The Corps of Engineers has studied these problems for several years as part of the over-all development of design criteria for airfield pavements being accomplished for the U. S. Air Force. Some of the information derived from these investigations has been presented previously; this paper summarizes the results. The studies have considered (a) the characteristics of the blast of jet aircraft and the effect of jet blast on bituminous pavements, (b) the characteristics of fuel spillage of jet aircraft and the effect of spillage on asphaltic pavements, and (c) fuel-resistant bituminous pavements.</p>		
KEYWORDS: Exhaust blast effects; Jet fuel resistant materials; Jet fuel spillage (Pavements)		

5010-107-75

REPLACES US FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R 2 D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
EVALUATION OF McCONNAUGHAY (MODEL HTD-500) ASPHALT PATCH PLANT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1957	26	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO.	Miscellaneous Paper No. 4-228	
10.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
11.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of tests performed with the McConnaughay (Model HTD-500) patch plant for the purpose of observing the behavior of the plant with reference to operation, handling, and performance, and of evaluating its capability to prepare both high-quality hot-asphaltic and portland-cement-concrete mixtures suitable for maintenance and repair of road and airfield pavements. The objectives of the study were accomplished by (a) mixing thirty-six 300-lb batches of hot-mix asphaltic concrete in which mixing procedures and moisture conditions were varied, (b) placing two surface patches of hot-mix bituminous pavement for observation of aging characteristics of the asphaltic concrete, (c) mixing six 3-cu-ft batches of portland-cement concrete utilizing two different mix designs and aggregates, (d) observing the patch plant in operation, and (e) performing laboratory tests on both asphaltic- and portland-cement-concrete mixtures produced by this plant.</p>		
KEYWORDS: Asphalt plants; Concrete plants; [McConnaughay patch plant]		

REPLACES DA FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
1. Sponsoring Military Activity (Corporate military)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
PLACEMENT OF COLD-MIXED ASPHALTIC PAVEMENTS IN THE CARIBBEAN AREA		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR (First name, middle initial, last name)		
Richard H. Groves		
7a. REPORT DATE	7b. TOTAL NO. OF PAGES	7c. NO. OF REFS
August 1957	26	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-232	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>This paper presents the experience of Richard H. Groves, Capt., CE, in constructing cold-mix bituminous pavements while assigned to the 806th Engineer Heavy Construction Battalion in the Caribbean area. It contains valuable information on the subject of design, construction, and control of cold-mix pavements. The original draft of the paper was referred to the Waterways Experiment Station by the Office, Chief of Engineers, for review and coordination with the author in preparing it in suitable form for publication as a WES Miscellaneous Paper. Personnel of the Flexible Pavement Laboratory, WES reviewed the paper and suggested certain revisions which were incorporated in the report.</p>		
<p>KEYWORDS: Flexible pavement construction; Flexible pavement design (Airfields); Flexible pavement design (Highways); [Caribbean Area]</p>		

REPLACES DD FORM 1673, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate authority)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
INTERIM REPORT ON STUDY OF PORPOISING		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Interim Report (1955 - 1957)		
5. AUTHOR(S) (First name, middle initial, last name)		
W. E. Buchanan		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1957	6	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-233	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report summarizes the results to February 1957 of the study of the effect of pavement roughness on the "porpoising" of the B-47 and B-52 airplanes. Porpoising is defined as a harmonic motion of the aircraft in which the plane acts as a rigid beam supported on two springs (the landing gear). The information for this investigation has been obtained from the following sources: (a) profiles of several runways where reports indicate porpoising or lack of porpoising, (b) conversations with pilots and operations officers, and (c) Boeing Airplane Company reports entitled "Theoretical Analysis of Ground-Roll Porpoising (B-47 Airplane)," dated 12 August 1953 and "Dynamic Study of Runway Exited Vibrations, B-52 Airplane," published in 1955.</p>		
KEYWORDS: Flexible pavements; Runways; Surface roughness (Pavements)		

DD FORM 173

REPLACES DD FORM 173, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
EFFECT OF TIRE PRESSURES AND LIFT THICKNESSES ON COMPACTION OF SOIL WITH RUBBER-TIRED ROLLERS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Willard J. Turnbull Charles R. Foster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1957	10	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-240	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (An, other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Field compaction studies were made with a rubber-tired roller to study the effect of variations in tire pressure and lift thickness. The soil was mixed with varying percentages of water, spread in lifts, and compacted to form test fills. The fills were then sampled to determine density and moisture contents. The principal findings were: <u>Effect of tire pressure</u>. Increasing the tire pressure, within practicable limits, is more effective in producing high densities than increasing repetitions of the roller within practicable limits. <u>Effect of lift thickness</u>. Densities produced in the top of the lift were the same regardless of lift thickness, but the density decreased with depth in the lift from 2 to 5 percentage points for each 6 in. of depth.</p>		
KEYWORDS: Compaction (Soils); Rubber-tired rollers		

REPLACES DA FORM 1073, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security Classification of this report and abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. SPONSORING ACTIVITY (Corporate activity) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE DEVELOPMENT OF MULTIPLE-WHEEL CBR DESIGN CRITERIA		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Charles R. Foster Richard G. Ahlvin		
6. REPORT DATE November 1957	7a. TOTAL NO. OF PAGES 11	7b. NO. OF REFS 7
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-243	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>This paper presents an improved method for developing multiple-wheel CBR design criteria from proven single-wheel criteria. It tells briefly of the development of the method and explains how it may be applied.</p>		
KEYWORDS: California Bearing Ratio; Flexible pavement design (Airfields); Multiple wheel landing gear		

DD FORM 1-73

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. SPONSORING ACTIVITY (Corporate authority)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
ASPHALT MIX DESIGN FOR DIFFERENT CLIMATIC REGIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Charles R. Foster Cecil D. Burns		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1957	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-244	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
This report describes a study made to explore the possibility of using available records of ambient temperatures to produce a cumulative index of the pavement temperature.		
KEYWORDS: Asphalt mix design; Bituminous concretes; Climatology		

55 12-1-73
REPLACES GPO FORM 1-73, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Mandatory)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
LABORATORY INVESTIGATION OF THE USE OF VARIOUS ELASTOMERS WITH TAR AS A BINDING AGENT FOR JET-FUEL- AND JET-BLAST-RESISTANT PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Loren M. Womack		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1957	23	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-245	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be associated with this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The Corps of Engineers has become interested in the use of tar-rubber blends as a binding agent for flexible pavements that will be resistant to the detrimental effects of jet-fuel spillage and jet blast. Commercially prepared blends as well as blends developed by the Waterways Experiment Station were tested for conformance to the Corps of Engineers interim guide specifications for tar-rubber blends. Methods and procedures for the blending of the various types of elastomers used were also included in the investigation. Based on this study, the following conclusions appear warranted: (a) rubbers other than oil resistant and polyvinyl chloride can be used to improve the temperature susceptibility of tar, (b) the type of additive used with the tar may have some effect on fuel penetration, and (c) the method of blending does not appear to be significant so long as heat and agitation are present.</p>		
KEYWORDS: Elastomers; Flexible pavements; Jet blast resistant materials; Jet fuel resistant materials; Rubberized-tar pavements		

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R. & D.		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		2b. GROUP
DRY-ICE FREEZING OF A SMALL UNPREPARED SOIL AREA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
J. C. Bunyard		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1957	2	
9a. CONTRACT OR GRANT NO.	9b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-246	
8. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report describes a test in which the time required to freeze unprepared lean clay soil with dry ice was determined. The time required for the frozen soil to return to approximately the temperature at which the test was begun was also determined.</p>		
KEYWORDS: Artificial freezing; Clays; Frozen soils		

53 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. Sponsoring Military Activity (Mandatory)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
NOTES ON THE CORPS OF ENGINEERS' CBR DESIGN PROCEDURES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR (First name, middle initial, last name)		
Charles R. Foster Richard G. Ahlvin		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1958	18	26
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-252	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Although this paper is concerned primarily with the California Bearing Ratio (CBR) design procedures as practiced by the Corps of Engineers, it is believed desirable to point out that the Corps of Engineers' flexible pavement design procedure embodies two features which deal with the pavement structure and a third which deals with the bituminous mixture. These are described and discussed in the paper.</p>		
<p>KEYWORDS: California Bearing Ratio; Design standards; Flexible pavement design (Airfields); Flexible pavement design (Highways)</p>		

35 48-1-73

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		12b. GROUP
STUDY OF SOIL-CEMENT BASE COURSES ON MILITARY AIRFIELDS		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(s) (First name, middle initial, last name)		
John F. Redus		
5. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1958	11	
6. CONTRACT OR GRANT NO.	8a. ORIGINATOR'S REPORT NUMBER(s)	
	Miscellaneous Paper No. 4-253	
8b. PROJECT NO.	8b. OTHER REPORT NO(s) (Any other numbers that may be assigned this report)	
9. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>A number of military airfields in the United States have been constructed with soil-cement base courses. An investigation of several of these fields was made by the Waterways Experiment Station to determine the behavior of these base courses under the conditions to which they had been subjected. This paper presents the results of the investigation. Studies were made at the following airfields where a portion of the paved facilities were constructed with soil-cement base courses: Turner AFB, Albany, Georgia; Moody AFB, Valdosta, Georgia; West Palm Beach AFB, West Palm Beach, Florida; Hot Springs, Arkansas, Municipal Airport and Adams Field (Little Rock, Arkansas, Municipal Airport); Clovis AFB, Clovis, New Mexico; and Edwards AFB, Muroc, California. Detailed visual inspections were made of all the pavements, and field and laboratory tests were performed at West Palm Beach, Moody, and Turner AFB's and Hot Springs Municipal Airport.</p>		
<p>KEYWORDS: Base courses; Flexible pavement performance and evaluation (Airfields); Soil cement; [Adams Field, Little Rock, Ark.; Clovis AFB, Clovis, Mexico; Edwards AFB, Muroc, Calif.; Moody AFB, Valdosta, Ga.; Municipal Airport, Hot Springs, Ark.; Turner AFB, Albany, Ga.; West Palm Beach AFB, West Palm Beach, Fla.]</p>		

DD FORM 1-73

REPLACES DD FORM 1-73, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
FAILURE CRITERIA FOR FLEXIBLE AIRFIELD PAVEMENTS		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
Charles R. Foster Richard G. Ahlvin		
7. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1958	7	
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-260	
10. DISTRIBUTION STATEMENT	11. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Approved for public release; distribution unlimited.		
12. SUPPLEMENTARY NOTES	13. SPONSORING MILITARY ACTIVITY	
14. ABSTRACT		
<p>The major causes of unsatisfactory conditions in flexible pavements that have been studied by the FPL are (a) inadequate thickness of subbase, base, and pavement, (b) inadequate compaction in the subgrade, subbase, and base, (c) inadequate durability in the bituminous layers, and (d) inadequate stability in the bituminous pavement under traffic during hot weather. It is recognized that unsatisfactory conditions can develop in flexible pavements for reasons other than those listed, but these are not discussed in this paper.</p>		
KEYWORDS: Flexible pavement failures (Airfields)		

DD FORM 1473

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. SPONSORING ACTIVITY (separate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		
PROGRESS REPORT ON THE CORPS OF ENGINEERS' KNEADING COMPACTOR FOR BITUMINOUS MIXTURES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
John L. McRae Alvin R. McDaniel		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1958	14	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-261	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>While the gyratory compactor is still under development, it is at this time considered to be a working tool and tentative test procedures have been established. In addition to being a compaction device for the preparation of specimens closely simulating actual pavement specimens and for the selection of optimum bitumen, the machine shows exceptional promise as a machine for making comparative quality tests on pavement mixtures and for predicting the expected life of a pavement.</p>		
<p>KEYWORDS: Compaction (Bituminous mixtures); Gyratory testing machines; Kneading compaction</p>		

DD FORM 1-73

REPLACES DD FORM 1-73, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE INDEX OF COMPACTION CHARACTERISTICS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) John L. McRae		
6. REPORT DATE June 1958	7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-269	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>This paper shows that a semilog plot of optimum dry density versus compaction effort in energy per unit volume gives essentially a straightline relationship. The slope of this line varies with the plasticity and other related properties, the slope becoming steeper as the plasticity increases and the soil becomes more difficult to compact. It is proposed that laboratory compaction tests, conducted at three compaction efforts and plotted as described, be used as a basis for a classification scheme. It is suggested that such data be used for guidance in establishing compaction requirements for different soils and for predetermining the amount of compaction effort necessary to achieve a desired field density.</p> <p>KEYWORDS: Compaction requirements; Compaction (Soils); Soil density</p>		

DD FORM 1473

NOV 65

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATOR'S NAME (Agency, Department, Office, etc.)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
FIELD COMPACTION TESTS WITH TERRAPAC VIBRATORY ROLLER		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
J. C. Bunyard J. D. Garnett		
7. REPORT DATE	8. TOTAL NO. OF PAGES	9. NO. OF REFS
June 1958	11	
10. CONTRACT OR GRANT NO.	11. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-271	
12. PROJECT NO.	13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
14. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; January 1974; HQDA (DAEN-MCE-D)		
15. SUPPLEMENTARY NOTES		16. SPONSORING MILITARY ACTIVITY
17. ABSTRACT		
<p>The Terrapac is a trailer-type machine with a compaction unit consisting of a single vibratory drum loaded to 3.3 tons. Tests were conducted to compare the compaction capabilities of the Terrapac with those of current conventional types of compaction equipment on a lean clay soil and on a crushed-limestone base course material. The density developed in the lean clay soil with the Terrapac on 6-in. lifts was considerably lower than that developed with conventional type rollers. Serious density gradients occurred; a poor bond was obtained between lifts; and surface laminations were observed. The density developed in the limestone base course material with the Terrapac on 4-in. lifts was comparable to densities developed with conventional type rollers. On 12-in. lifts, the density developed with the Terrapac was four percentage points (modified AASHTO maximum) less than that obtained in 4-in. lifts. No apparent deficiencies were found in the structural or mechanical features of the Terrapac. However, the period of operation was not long enough to determine the mechanical adequacy.</p>		
KEYWORDS: Compaction (Soils); Vibratory compactors		

55-44-778

FORM 1073, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		10. REPORT SECURITY CLASSIFICATION Unclassified 11. GROUP
2. REPORT TITLE FIELD COMPACTION TESTS WITH DUO-PACTOR		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) J. C. Bunyard		
6. REPORT DATE June 1958	7. TOTAL NO. OF PAGES 15	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. A. PROJECT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-272
8c. 8d.		8e. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; January 1974; HQDA (DAEN-MCE-D)		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT <p>This report presents results of field tests of the Duo-Pactor, a soil compactor that incorporates a steel-wheel roller in conjunction with a rubber-tired roller. Tests were made on a lean clay soil and a crushed-limestone base course material to evaluate the Duo-Pactor's compacting capabilities and determine its mechanical adequacy. Test results indicated that the Duo-Pactor did not produce densities in the lean clay material as high as those produced by a standard 50-ton rubber-tired roller. Slightly better compaction was obtained when both the rubber-tired and steel rollers were used. The degree of compaction obtained in the lean clay by eight coverages of the Duo-Pactor was considerably less than the 100% modified AASHTO requirement; however, the densities obtained in the crushed-limestone material did meet this requirement. No structural or mechanical deficiencies were apparent; however, the period of operation was too short to determine fully the mechanical adequacy of this compactor.</p> <p>KEYWORDS: Compaction (Soils); Rubber tired rollers; Steel wheel rollers</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DISSEMINATION CONTROL DATA - R & D		
1. ORIGINATOR'S ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
FIELD COMPACTION TESTS WITH DYNAPACTOR		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
J. C. Bunyard		
7. REPORT DATE	8. TOTAL NO. OF PAGES	9. NO. OF REFS
June 1958	19	
10. CONTRACT OR GRANT NO.	11. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-273	
12. PROJECT NO.	13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
14. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; January 1974. Other requests for this document must be referred to Office, Chief of Engineers HQDA (DAEN-MCE-D).		
15. SUPPLEMENTARY NOTES	16. SPONSORING MILITARY ACTIVITY	
17. ABSTRACT		
<p>The Dynapactor is a trailer-type machine in which the compacting force is produced by two engine-driven units, each equipped with counter-rotating eccentric weights. Tests were performed on a lean clay soil and a crushed-limestone base course material to compare the compaction capabilities of the Dynapactor with those of conventional types of compaction equipment. The densities developed in the clay by the Dynapactor were less than those developed with conventional heavy rubber-tired and steel-wheel rollers. Serious density gradients occurred within lifts; a poor bond was obtained between lifts; and laminations were observed within the lifts. The density developed in the limestone by the Dynapactor equipped with tamping bars is higher (but density developed with sled-type feet is lower) than that obtained with conventional compaction equipment. These tests indicate a need to more fully develop the Dynapactor to determine the best combination of foot design and method of operation for compaction of various soil types.</p>		
KEYWORDS: Compaction equipment; Compaction (Soils); Impact compaction		

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		
FUEL-SPILLAGE AND TRAFFIC TESTS ON JENNITE J-16 SEAL-COAT MATERIAL		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(s) (First name, middle initial, last name)		
Raymond Hansen		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1958	6	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(s)	
	Miscellaneous Paper No. 4-287	
9. PROJECT NO.	9b. OTHER REPORT NO(s) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; January 1974. Other requests for this document must be referred to Office, Chief of Engineers HQDA (DAEN-MCE-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of fuel-spillage and traffic tests conducted on the rubberized tar-concrete parking apron at Williams Air Force Base, Phoenix, Arizona, which had been sealed with Jennite J-16 seal-coat material. The purpose of the tests was to obtain information as to how the Jennite J-16 seal-coat material, placed under contract conditions would perform which subjected to fuel-spillage and traffic tests, and to compare the results of these tests with the results of similar tests conducted on the same seal-coat material at the Waterways Experiment Station.</p>		
<p>KEYWORDS: Jet fuel resistant materials; Jet fuel spillage (Pavements); Rubberized-tar pavements; Seal coats; Traffic tests; [Williams AFB, Phoenix, Arizona]</p>		

DD FORM 173

REPLACES DD FORM 173, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classifications at this level of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate identity)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
LABORATORY INVESTIGATION OF ASBESTOS FIBERS WITH EMULSIFIED SEAL-COAT MATERIALS FOR RUBBERIZED-TAR CONCRETE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Raymond Hansen		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1958	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-288	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>This report presents the results of a limited number of tests in which asbestos fibers were used as an additive in emulsified seal-coat materials for rubberized-tar concrete pavements. The investigation was initiated upon the discovery of a seal-coat material on some pavement cores taken from the center portion of an asphaltic concrete parking apron at Simmons Army Airfield, Fort Bragg, North Carolina, containing asbestos fibers, which showed great resistance to both jet fuel and heat. The objectives of the study were to determine if the resistance of commercially available seal-coat materials to jet-fuel spillage, heat and cold, weathering, and traffic could be improved by the addition of asbestos fibers. The study consisted of: (a) mixing a total of 13 experimental batches of emulsified seal-coat materials both with and without asbestos fibers of various grades and added in various proportions; (b) subjecting samples and coatings from each of the experimental mixtures to both submergence in and spillage of jet fuel, and submergence in hot water to determine adhesive properties of the seal coats; (c) measuring thickness and tensile strength of the coatings; (d) exposing the various coatings to prolonged and extensive heat, freezing, and weathering; and (e) placing four small seal-coat patches on a highly trafficked bituminous pavement surface.</p>		
<p>KEYWORDS: Asbestos; Emulsions; Flexible pavements; Jet fuel resistant materials; Rubberized-tar pavements; Seal coats</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate authority)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
LABORATORY STUDY FOR IMPROVEMENT OF RUBBERIZED-TAR SPECIFICATIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1958	8	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO.	Miscellaneous Paper No. 4-292	
C.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>The tests reported herein involved two rubberized-tar materials, termed product A and product B, each of which had been used in experimental pavements at Williams and Davis-Monthan Air Force Bases. Pavement cores taken at these airfields by WES personnel, and also samples furnished by the South Pacific Division Laboratory, were subjected to specification tests. Neither product A nor product B met all of the specification test requirements. Special laboratory tests were conducted, including: (a) penetration tests, (b) distillation tests, (c) dispersion tests, (d) viscosity tests, (e) weight- and volume-change tests, and (f) smear tests. The material with the least total amount of volatiles lost in the distillation test showed the least cracking; also, the material having the least weight and volume change after prolonged heating showed the least cracking. It is concluded that improved specifications should require tar having less volatiles than were present in the product A and product B materials.</p>		
KEYWORDS: Rubberized tar; Rubberized-tar pavements; Specifications		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. CONTRACTING AGENCY (Corporate identity)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
EVALUATION OF THE CALIFORNIA EXTRACTOR FOR BITUMINOUS PAVEMENT		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
William H. Larson		
7. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1958	10	
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-294	
10. PROJECT NO.	11. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
12. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
13. SUPPLEMENTARY NOTES		14. SPONSORING MILITARY ACTIVITY
15. ABSTRACT		
<p>Tests were conducted with the California field-type extractor to observe its operation and to evaluate its capability for simultaneous determination in a single apparatus of bitumen and water contents of pavement samples. It was found that the degree of accuracy of both the water-content and asphalt-content determinations made with the apparatus was acceptable. The apparatus is suitable for general use by Corps of Engineers laboratories for asphalt-content determinations with nonflammable low-toxicity solvents, but is not suitable for water-content determinations because of the necessity of using flammable solvents which is prohibited by Corps of Engineers safety regulations. If a satisfactory non-flammable solvent is found, this objection will be overcome.</p>		
KEYWORDS: Bitumens; Flexible pavements; Measuring instruments; Water content determination (Pavements); [California extractor]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate number)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
USE OF NONFLAMMABLE SOLVENTS IN DETERMINING THE WATER CONTENT OF BITUMINOUS MIXTURES		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
Gordon L. Carr		
7a. REPORT DATE	7b. TOTAL NO. OF PAGES	7c. NO. OF REFS
February 1959	7	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-301	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Tests were conducted to investigate and evaluate nonflammable solvents for use in the determination of the water content of bituminous mixtures. Solvents tested included: 1,1,1 trichloroethane, perchloroethylene, and 1,1,2 trichloroethane. Because of its high boiling point and the small correction required in test results, 1,1,2 trichloroethane is the most suitable of the three nonflammable solvents tested. However, 1,1,1 trichloroethane is also satisfactory provided a control test is run first to establish the proper correction quantity. It has the advantage of not absorbing water; its main disadvantages are a low boiling point and the fact that the water recovered in tests using this solvent may have a milky or cloudy appearance. Perchloroethylene is considered unsatisfactory. A proposed procedure for determination of the water content of bituminous mixtures using a nonflammable solvent, together with instructions for determining the correction quantity, is included in an appendix.</p>		
KEYWORDS: Bitumens; Water content determination (Pavements)		

DD FORM 134-773

REPLACES DD FORM 134, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

When the classification of this report is changed, the classification of the abstract and indexing information must be changed when the overall report is classified.

1. SPONSORING ACTIVITY (Corporate authority)		2. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		4b. GROUP	
LABORATORY TESTS FOR BITUMINOUS SEAL-COAT MATERIALS SPECIFICATIONS			
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
6. AUTHOR(S) (First name, middle initial, last name)			
Raymond Hansen			
7. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1959		12	
8. CONTRACT OR GRANT NO.		9. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO.		Miscellaneous Paper No. 4-302	
10. DISTRIBUTION STATEMENT		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	

13. ABSTRACT

This report presents the results of a study to develop suitable laboratory performance tests to be incorporated in the interim guide specifications for bituminous seal-coat materials for rubberized-tar concrete airfield pavements. The specific purposes of the study were to: (a) develop a number of performance tests that can be conducted in a laboratory within a reasonable length of time, and (b) establish or select test limits that suitable sealing materials will meet and unsuitable materials will fail to meet. Throughout the laboratory research, the objectives were to establish realistic limits or ranges of performance or properties which the satisfactory rubberized-tar emulsions can presently meet, or can easily be made to meet by the manufacturers, and which the fair or poor materials will fail in at least one respect. The objectives of the study were accomplished by (a) selecting seven emulsions with performance ratings ranging from satisfactory to poor as established in previous field tests, (b) coating 71 ceramic tiles and 105 metal plates with the various emulsions, and (c) testing the tiles and plates, as well as samples of the materials, to determine their resistance to the action of hydrocarbon solvents, distilled water, cold and heat, their flexibility, chemical and physical properties and volatilization, and their stability when mixed with acid. Additional tests were made to correlate the JP-4 jet fuel used in the solvent tests with another fuel which can be used as a standard test fuel by all laboratories.

KEYWORDS: Bitumens; Rubberized-tar pavements; Seal coats; Specifications

DD FORM 1373, 1 JAN 59, WHICH IS
REPLACES DD FORM 1373, 1 JAN 59, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
ACCELERATED PROOF-TESTS OF RUNWAY PAVEMENT, COLUMBUS AIR FORCE BASE, MISSISSIPPI		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
Charles R. Foster James P. Sale		
7. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1959	22	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-303	
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT		
<p>The primary purpose of the Columbus tests was to proof-test the Army Corps of Engineers flexible pavement design and construction methods for interiors of runways to be used by B-52 planes. It was desired that the juncture between the flexible and rigid pavements be included in the tests. Consequently a portion of the rigid pavement was also subjected to traffic.</p>		
KEYWORDS: Accelerated traffic tests; Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); Runways; [Columbus Air Force Base, Mississippi]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

REPORT CLASSIFICATION

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE PERFORMANCE OF RUBBERIZED-TAR CONCRETE PAVEMENTS ON AIRFIELD FACILITIES			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Zelma B. Fry Miller J. Mathews Alfred H. Joseph			
6. REPORT DATE February 1959		7a. TOTAL NO. OF PAGES 10	7b. NO. OF REFS 7
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-304	
b. PROJECT NO.			
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT This report describes visual observations of the behavior of in-place rubberized-tar concrete pavements at fourteen Air Force bases, and results of laboratory tests on core specimens obtained from these pavements to defuel spillage, and weathering in various climatic zones. The core specimens were subjected to density, stability, extraction and gradation tests, and void relations were computed. The gradation and extraction tests cannot be considered entirely reliable as it was impossible to separate the binder and aggregate completely. KEYWORDS: Flexible pavement performance and evaluation (Airfields); Jet fuel spillage (Pavements); Military bases; Rubberized-tar pavements; Weathering effects; [Davis-Monthan AFB, Tuscon, Ariz.; Dover AFB, Del.; Dow AFB, Bangor, Maine; Goose Bay AFB, Labrador; Hanscom AFB, Bedford, Mass.; Hickam AFB, Hawaii; Homestead AFB, Homestead, Fla.; McChord AFB, Tacoma, Wash.; MacDill AFB, Tampa, Fla.; Presque Isle AFB, Presque Isle, Maine; Thule AFB, Greenland; Walker AFB, Roswell, N. Mex.; W. Palm Beach AFB, W. Palm Beach, Fla.; Williams AFB, Chandler, Ariz.]			

DD FORM 1473

VCRM
1 NOV 55REPLACES DD FORM 1473, 1 JAN 55, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R 3 D		
<small>(When the document is of 100% or more of abstract and indexing annotation must be entered when the report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified 3. GROUP
4. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; GOODFELLOW AIR FORCE BASE, AUXILIARY FIELD NO. 6, VAN COURT, TEXAS		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
7. REPORT DATE December 1957	7a. TOTAL NO. OF PAGES 8	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-305	
a. PROJECT NO. c. d.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Ft. Worth, Texas
13. ABSTRACT <p>A limited amount of information was available on the design and construction of the pavements at Goodfellow Air Force Base Auxiliary Field No. 6 for use in determining the load-carrying capacities of the facilities. Results of tests performed for a Waterways Experiment Station field moisture study were also utilized in analyzing the engineering characteristics of the pavement components. Available results of undisturbed laboratory CER tests made on the subgrade for design purposes show values ranging from 3.2 to 4.6 which indicate a subgrade CER of 4. Laboratory CER values on remolded samples of the subgrade material at 100% modified AASHTO density ranged from 4 to 14 with corresponding values of 2-4 at 95% modified AASHTO density. Results of construction-control density tests indicated that the subgrade material was compacted to 95% of modified AASHTO maximum density. Three field in-place CER tests performed on the subgrade at a single location during construction indicated an average value of 20. An evaluation based on a total thickness of 12 in. (2-in. asphaltic-concrete wearing course, 6-in. crushed-limestone base, and a 4-in. caliche subbase) and a subgrade CER of 4 will give the design single-wheel load of 8000 lb at 100-psi tire pressure. However, the performance records of the pavements under traffic indicate that they have withstood approximately minimum operations of aircraft having a 15,000-lb single-wheel load and show no signs of distress from overload. A CER value of 9 has been selected for the subgrade material for use in evaluation. The subgrade is the controlling factor in determining the load-carrying capacity of the pavements.</p> <p>KEYWORDS: California Bearing Ratio tests; Flexible pavement performance and evaluation (Airfields); [Goodfellow Air Force Base, Aux. Field No. 6, Van Court, Texas]-</p>		

DD FORM 1473

(REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE)

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(The classification of this form of abstract and index information must be entered when the overall report is classified)</small>		
<small>1. ORIGINATING ACTIVITY (Corporate author)</small> U. S. Army Engineer Materways Experiment Station Vicksburg, Mississippi		<small>2a. REPORT SECURITY CLASSIFICATION</small> Unclassified <small>2b. GROUP</small>
<small>3. REPORT TITLE</small> AIRFIELD PAVEMENT EVALUATION; GOODFELLOW AIR FORCE BASE, SAN ANGELO, TEXAS		
<small>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</small>		
<small>5. AUTHOR(S) (First name, middle initial, last name)</small>		
<small>6. REPORT DATE</small> March 1958	<small>7a. TOTAL NO. OF PAGES</small> 2	<small>7b. NO. OF REFS</small>
<small>8a. CONTRACT OR GRANT NO.</small> <small>8b. PROJECT NO.</small>	<small>9a. ORIGINATOR'S REPORT NUMBER(S)</small> Miscellaneous Paper No. 4-306 <small>9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</small>	
<small>10. DISTRIBUTION STATEMENT</small> Approved for public release; distribution unlimited.		
<small>11. SUPPLEMENTARY NOTES</small>	<small>12. SPONSORING MILITARY ACTIVITY</small> U. S. Army Engineer District, Ft. Worth, Texas	
<small>13. ABSTRACT</small> <p>A visual survey of the pavements was made in August 1956 and at that time all runways and taxiways seemed to be performing satisfactorily under the loads imposed. Some minor cracking and rutting were noted on the blast pad located at the north end of the NE-SW runway. The seal coat on the runways and taxiways appeared to be slightly rich, and some bleeding was occurring in the areas most used. Tire printing was evident in these areas. Some softening of the pavements as a result of oil spillage was noted on parts of the apron; however, sand had been applied to absorb the excess oil. No detrimental effects were noted from the spilling of jet fuel; only one jet plane (T-33) was located at the base at the time of this inspection. In general, the primary facilities were considered to contain no defects that would hinder normal aircraft operations.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Goodfellow Air Force Base, San Angelo, Texas]		

DD FORM 137

REPLACES DD FORM 137, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
AIRFIELD PAVEMENT EVALUATION; DYESS AIR FORCE BASE, ABILENE, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(s) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1958	2	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO.	Miscellaneous Paper No. 4-309	
10. DISTRIBUTION STATEMENT	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
	U. S. Army Engineer District, Ft. Worth, Texas	
13. ABSTRACT		
<p>A visual inspection of the pavements in August 1957 indicated the pavements to be in excellent condition except for an area on a portion of the runway (about sta 210+00) where minor longitudinal shrinkage cracks were found. The cracks were few in number and were located about 7 to 30 ft east of the center line of the runway. Slight cracking was also found in the runway pavement overlying a water line (sta 270+00). The facilities necessary for operation of the field are considered to contain no undesirable defects that would hinder normal aircraft operations.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Dyess Air Force Base, Abilene, Texas]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12. REPORT SECURITY CLASSIFICATION Unclassified
2. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION; JAMES CONNALLY AIR FORCE BASE, WACO, TEXAS		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(s) (First name, middle initial, last name)		
5. REPORT DATE		
May 1958		
7a. TOTAL NO. OF PAGES		
2		
7b. NO. OF REFS		
8. CONTRACT OR GRANT NO.		
9a. ORIGINATOR'S REPORT NUMBER(S)		
Miscellaneous Paper No. 4-310		
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		
12. SPONSORING MILITARY ACTIVITY		
U. S. Army Engineer District, Fort Worth, Texas		
13. ABSTRACT		
<p>A visual inspection of the pavements in August 1956 indicated the primary facilities to be in excellent condition. A strengthening program for the primary facilities had recently been completed; therefore, the pavements had been subjected to very little traffic. The southeast end of NW-SE runway 2 and the northeast end of the NE-SW runway were not strengthened, but the old pavements were in fair condition. The NW-SE runway 2 and the NE-SW runway are secondary pavements and are subjected to very little traffic.</p>		
KEYWORDS: Flexible pavement performance and evaluation; Rigid pavement performance and evaluation (Airfields); [James Connally Air Force Base, Waco, Texas]		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(For the classification of this, body of abstract and indexing annotation must be entered when the report is classified.)</small>		
1. ORIGINATOR'S NAME AND ADDRESS (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified 3. GROUP
4. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; McCLELLAN AIR FORCE BASE, SACRAMENTO, CALIFORNIA; REPORT NO. 6		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
7. REPORT DATE May 1958	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.		9. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-311, Report No. 6
9. PROJECT NO.		10. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
11. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
12. SUPPLEMENTARY NOTES		13. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Sacramento, California
14. ABSTRACT <p>A visual inspection of all pavements in December 1957 indicated the pavements to be in excellent to poor condition. Portions of the pavements on aprons T, S, and O; taxiways A, C, and D; apron E taxiway; and the NE-SW runway (which is used for parking aircraft) contained a large percentage of structural defects in the portland cement concrete as a result of overload. The south end of the N-S runway (pavement designation No. 9, fig. 1) was in fair condition with a minor amount of the slabs containing structural defects. The pavements constructed in 1956 and 1957 were in excellent condition. In general, the taxilanes on aprons T, S, and O, apron E taxiway, and taxiway D are in poor condition, and continued use by heavy aircraft may damage the pavements sufficiently to hinder future normal aircraft operations.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [McClellan Air Force Base, Sacramento, Calif.]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

SECURITY CLASSIFICATION

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION; REPORT NO. 7 ON MCCLELLAN AIR FORCE BASE, SACRAMENTO, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1959	5	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO.	Miscellaneous Paper No. 4-311, Report No. 7	
10. DISTRIBUTION STATEMENT	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
	U. S. Army Engineer District, Sacramento, California	
13. ABSTRACT		
<p>The purpose of this report is to revise and bring up to date the McClellan Air Force Base evaluation report, dated May 1958, by evaluation of pavements constructed at this airfield since 1957. These pavements (constructed in 1958-59 under the supervision of the U. S. Army Engineer District, Sacramento, and the Air Force Installation Engineer) are shown in fig. 1.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [McClellan Air Force Base, Sacramento, Calif.]</p>		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		10. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION; REPORT NO. 8 ON McCLELLAN AIR FORCE BASE, SACRAMENTO, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1960	5	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-311, Report No. 8	
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Sacramento, California
13. ABSTRACT		
<p>The purpose of this report is to revise and bring up to date the McClellan Air Force Base evaluation report, dated Dec 1959, by evaluation of pavements constructed at this airfield since August 1959. These pavements (constructed in the latter part of 1959 under the supervision of the U. S. Army Engineer District, Sacramento) are shown in fig. 1.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [McClellan Air Force Base, Sacramento, Calif.]</p>		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
AIRFIELD PAVEMENT EVALUATION; TRAVIS AIR FORCE BASE, FAIRFIELD, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE		
June 1958		
7a. TOTAL NO. OF PAGES		
2		
7b. NO. OF REFS		
8. CONTRACT OR GRANT NO.		
9a. ORIGINATOR'S REPORT NUMBER(S)		
Miscellaneous Paper No. 4-312		
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		
12. SPONSORING MILITARY ACTIVITY		
U. S. Army Engineer District, Sacramento Sacramento, California		
13. ABSTRACT		
<p>A visual inspection of all pavements in December 1957 showed them to be in excellent to fair condition. The pavements on both runways were in excellent condition with the exception of a slight settlement at the rigid-flexible joint on the primary runway. Pavements in the taxiway area designated T-25 (fig. 1) contained numerous slabs with structural defects. On taxiway T-29, the longitudinal joint 25 ft right of the center line had rayeled the entire length of the taxiway. Pavements in areas designated T-23 and T-26 were in excellent condition. Portions of the pavement on the north end of taxiway T-10 contained slabs that were badly cracked. In general, the pavements necessary for operation of the field contained no undesirable defects that would hinder normal aircraft operations.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Travis Air Force Base, Fairfield, Calif.]		

DD FORM 1378

REPLACES DD FORM 1378, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>1. The classification of this form of abstract and indexing annotation must be entered when the overall report is classified.</small>		
<small>2. CONTRACTING ACTIVITY (Corporate author)</small> U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		<small>3. REPORT SECURITY CLASSIFICATION</small> Unclassified <small>4b. GROUP</small>
<small>5. REPORT TITLE</small> AIRFIELD PAVEMENT EVALUATION; GRAY AIR FORCE BASE, KILLEEN, TEXAS		
<small>6. DESCRIPTIVE NOTES (Type of report and inclusive dates)</small>		
<small>7. AUTHOR(S) (First name, middle initial, last name)</small>		
<small>8. REPORT DATE</small> June 1958	<small>9a. TOTAL NO. OF PAGES</small> 2	<small>9b. NO. OF REFS</small>
<small>10. CONTRACT OR GRANT NO.</small>	<small>11. ORIGINATOR'S REPORT NUMBER(S)</small> Miscellaneous Paper No. 4-313	
<small>12. PROJECT NO.</small>	<small>13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</small>	
<small>14. DISTRIBUTION STATEMENT</small> Approved for public release; distribution unlimited.		
<small>15. SUPPLEMENTARY NOTES</small>		<small>16. SPONSORING MILITARY ACTIVITY</small> U. S. Army Engineer District, Ft. Worth Ft. Worth, Texas
<small>17. ABSTRACT</small> A visual inspection of the pavements in August 1956 revealed some longitudinal shrinkage cracks on the runway and evidence of a small amount of fuel spillage on the north parking apron; however, the facilities were in a generally satisfactory condition. Facilities necessary for operation of the field contained no undesirable defects that would hinder normal aircraft operations.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Gray Air Force Base, Killeen, Texas]		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE

Unclassified

Reporting Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2b. GROUP		
3. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION; MOODY AIR FORCE BASE, VALDOSTA, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1958	18	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO.	Miscellaneous Paper No. 4-314	
10.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Department of Defense only; May 1974. Other requests for this document must be referred to U. S. Army Engineer District, Savannah.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Savannah Savannah, Georgia
13. ABSTRACT		
This report summarizes data contained in previously published reports and obtained during construction of the airfield pavements at Moody Air Force Base. The purpose of this report is to determine the load-carrying capacities of the pavements with respect to various landing gear assemblies. The report includes all available information relative to the factors affecting the load-carrying capacity of the runways, taxiways, and aprons. It is primarily concerned with the facilities in use in 1957.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Moody Air Force Base, Valdosta Georgia]		

DD FORM 137-1

REPLACES DD FORM 137, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE

Unclassified

Unclassified

SECURITY CONTROL DATA - R & D		
<small>(For use in classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING AGENCY (Comprehensive authority)		12. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		13. GROUP
AIRFIELD PAVEMENT EVALUATION: BERGSTROM AIR FORCE BASE, AUSTIN, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE		
September 1958		
7a. TOTAL NO. OF PAGES		
7b. NO. OF REFS		
14. CONTRACT OR GRANT NO.		8a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO.		Miscellaneous Paper No. 4-315
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Ft. Worth Ft. Worth, Texas
13. ABSTRACT A visual inspection of all pavements in August 1956 showed them to be in fair to excellent condition. Minor cracking was noted in some of the portland cement concrete slabs on parking apron A. Numerous birdbaths existed in the pavement surface on N-S runway 1. In general, the pavements necessary for operation of the field contained no undersirable defects that would hinder normal aircraft operations.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Bergstrom Air Force Base, Austin, Texas]		

DD FORM 1-72

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of this form of abstract and indexing annotation must be entered when the overall report is classified)</small> 1. SPONSORING ACTIVITY (Corporate authority) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; REPORT NO. 7 ON MATHER AIR FORCE BASE, SACRAMENTO, CALIFORNIA		2. REPORT SECURITY CLASSIFICATION Unclassified 4b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE January 1959	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-316	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other number that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Sacramento Sacramento, California
13. ABSTRACT A visual inspection was made of all pavements on 24 September 1958. The recently constructed heavy-duty pavements were in excellent condition. Numerous "birdbaths" and some cracking of the asphaltic concrete pavement were noted in the parking area. The 6-inch portland-cement concrete facilities constructed during World War II were in very poor condition as a result of overload. In general, the facilities necessary for operation of the field contained no undesirable defects that would hinder normal aircraft operations.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Mather Air Force Base, Sacramento, Calif.]		

DD FORM 473

REPLACES DD FORM 473, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(See the Classification of 1976, how at abstract and indexing information must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE LABORATORY INVESTIGATION OF MOMENT-TRANSFERRING END JOINTS FOR AIRPLANE LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) William L. McInnis J. L. Garrett		
6. REPORT DATE January 1959	7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-317	
9. PROJECT NO. 8-70-00-000 Subproject 8-70-03-440	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Tests were conducted on two designs of moment-transferring end joints for steel airplane landing mat to determine their relative beam strength. One design, which was submitted by Mr. G. G. Greulich, consisted basically of an overlapping end connection fastened by two steel bars inserted transversely through slots in the sides of the mat ribs. The other design, developed by the Corps of Engineers, consisted essentially of sliding steel pins set in the mat ribs and held in place by steel cover plates. Tests indicated the beam strength of the Corps of Engineers design to be greater than that of the Greulich design.		
KEYWORDS: Construction joints; Steel landing mats		

53 44-478

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

REPORT CLASSIFICATION

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING AGENCY (Corporate authority)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
AIRFIELD PAVEMENT EVALUATION; REPORT NO. 8 ON MATHER AIR FORCE BASE, SACRAMENTO, CALIFORNIA		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
7. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1959	3	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-321	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Sacramento Sacramento, California
13. ABSTRACT A visual inspection of all the pavements indicated the pavements to be in poor to excellent condition. The heavy duty pavements were in excellent condition. Numerous "bird-baths" and some cracking of the asphaltic concrete pavement were noted in the light-duty parking area. The 6-in. portland-cement concrete facilities constructed during World War II were in poor condition as a result of overload. The newly constructed facilities, alert apron and stubs, T and B apron, nose docks, and apron extension, were in excellent condition. In general, the facilities necessary for operation of the field contained no undesirable defects that would hinder normal aircraft operations.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Mather Air Force Base, Sacramento, Calif.]		

DD FORM 137-473

REPLACES DD FORM 137, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Classification of this report, based on abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
THEORY AND APPLICATION OF A GYRATORY TESTING MACHINE FOR HOT-MIX BITUMINOUS PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
John L. McRae Charles R. Foster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1959	10	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-333	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT A procedure is proposed for designing and controlling the construction of pavement for heavy airplane traffic. The gyratory testing machine and the proposed test procedures are described; also, the proposed further development with this machine is discussed briefly.		
KEYWORDS: Gyratory testing machines; Hot mix		

DD FORM 1378

REPLACES DD FORM 1378, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate authority)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
EFFECTS OF ASBESTOS FIBERS IN ASPHALTIC CONCRETE PAVING MIXTURES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Raymond Hansen Alfred H. Joseph		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1959	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-335	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; January 1974. Other requests for for this document must be referred to Office, Chief of Engineers HQDA (DAEN-MCE-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This report presents the results of laboratory study of the use of asbestos fibers as an additive in asphaltic concrete paving mixtures. The purpose of the study was to determine: (a) whether asbestos fibers can be evenly distributed in asphaltic concrete paving mixtures, and if so, through what process; (b) the approximate quantity of asbestos fibers that should be added; and (c) the effects of asbestos fibers in asphaltic concrete mixes, especially in regard to the rate of densification of bituminous mixes under high compaction efforts.		
KEYWORDS: Asbestos; Bituminous concretes; Flexible pavements		

DD FORM 1473

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Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(If a classification of this report or abstract and index is required, it must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified
		12b. GROUP
2. REPORT TITLE MEASUREMENT OF EFFECTS OF TRAFFIC WITH THE SHELL ROAD VIBRATION MACHINE		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(S) (First name, middle initial, last name) Audley A. Maxwell Alfred H. Joseph		
5. REPORT DATE July 1959	7a. TOTAL NO. OF PAGES 12	7b. NO. OF REFS 5
6. CONTRACT OR GRANT NO.	8a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-347	
7. PROJECT NO.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
9. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
10. SUPPLEMENTARY NOTES		11. SPONSORING MILITARY ACTIVITY
12. ABSTRACT This paper describes the Columbus Air Force Base, Mississippi, tests and results together with other information necessary for an analysis of the test results. In order to validate design criteria, the U. S. Army Corps of Engineers began accelerated traffic tests on a portion of the runway immediately after its construction. During the application of this traffic, several tests were made with the road vibration machine. The traffic tests and the subsurface conditions at the completion of the tests are described briefly before the results of the vibratory tests are presented. This information is included to show the effects of traffic as measured by conventional tests for comparison with the results of the vibratory tests.		
KEYWORDS: Accelerated traffic tests; Flexible pavement performance and evaluation (Airfields); Vibration response tests; [Columbus Air Force Base, Mississippi]		

DD FORM 1373

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Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(When the classification of this form at abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
DYNAMIC TESTING OF PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
W. Heukelom Charles R. Foster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1959	27	24
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-348	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Each time a vehicle passes over a pavement the surface is deflected and rebounds, creating temporary strain conditions for 0.01 to 0.1 second. Information about these strain conditions can be obtained by observing the movements of the pavement under similar dynamic loading conditions. Methods used for the dynamic investigation of pavements, base courses, and subgrades are described in the present paper.		
KEYWORDS: Dynamic loads; Flexible pavements; Pavement deflection; Traffic tests		

DD FORM 1473, 1 JAN 54, WHICH IS
OCCUPY FOR ARMY USE.

Unclassified

JUDGMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		4b. GROUP
AIRFIELD PAVEMENT EVALUATION: ALTUS AIR FORCE BASE, ALTUS, OKLAHOMA		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(s) (First name, middle initial, last name)		
5. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1959	2	
6. CONTRACT OR GRANT NO.	8a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-352	
9. PROJECT NO.	8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT A visual inspection of Altus Air Force Base in September 1958 showed all pavements to be in excellent condition except for a joint spall in the central wing of the parking apron and two spall areas near the nose docks in the north wing of that apron. Loose particles of concrete were lying on the pavement in the spall areas but the damage was minor and needed little maintenance. Minor longitudinal cracks were noted in about 10 slabs (16-inch portland-cement concrete) in the operational apron. Taxiway 10, from the north wing of the parking apron to the abandoned E-W runway, was in poor condition as a result of overload from B-52 aircraft. The taxiway had been patched many times by installations engineer personnel during the period when taxiway 11 was being reconstructed. Taxiway 10 was the only active taxiway from the apron area at this time and had to be kept in repair in order that operations could be continued at the base.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Altus Air Force Base, Altus, Oklahoma]		

DB 100-373

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
AIRFIELD PAVEMENT EVALUATION; ALTUS AIR FORCE BASE, ALTUS, OKLAHOMA (DETAILED REPORT COMPLETE WITH SUPPORTING DATA)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1959	21	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-353	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Tulsa Tulsa, Oklahoma
13. ABSTRACT This report summarizes data contained in previously published reports concerning the airfield pavements at Altus Air Force Base. The purpose of this report is to determine the load-carrying capacities of the pavements with respect to various landing gear assemblies and life categories. The report includes all available information relative to the factors affect- ing the load-carrying capacity of the runways, taxiways, and aprons. The pavements constructed during the period 1952-1958 are evaluated on the basis of tests made for design and construction purposes; no special tests were made for this evaluation.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Altus Air Force Base, Altus, Oklahoma]		

DD FORM 1378

REPLACES DD FORM 1378, 1 JAN 54, WHICH IS
OBSOLETE FOR ARMY USE

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Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION FOR DAVIS FIELD, MUSKOGEE, OKLAHOMA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR (First name, middle initial, last name)		
6. REPORT DATE September 1959	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO.	Miscellaneous Paper No. 4-356	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT A visual inspection of all pavements in June 1959 showed them to be in excellent to poor condition. The 1942-43 portland-cement concrete pavements (parking apron, NE-SW runway, and taxiways II, III, and V) that are considered to be operational at the present time were in poor condition. After a period of abnormal rainfall in 1957, alkali-aggregate reaction had severely deteriorated the portland-cement concrete in these facilities. Deterioration is more pronounced in areas of poor drainage, where it has progressed to the extent that the pavements are considered failed and an operational hazard. The worst area of deterioration was noted on the parking apron. Operation of jet aircraft should be restricted on these pavements because of the damage that could be done to the jet engines by loose debris on the pavement surface. Commercial, propeller-type, aircraft (DC-3) are utilizing the parking apron for operations. The pavements constructed in 1957-58 are in excellent condition. A few cracks that occurred at the joints prior to sawing were noted in one lane on taxiway VI. KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Davis Air Force Base, Muskogee, Okla.]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 56, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
<small>1. ORIGINATING ACTIVITY (Corporate author)</small> U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		<small>2a. REPORT SECURITY CLASSIFICATION</small> Unclassified
<small>2b. GROUP</small>		
<small>3. REPORT TITLE</small> COMPARISON OF COMPACTION DATA DEVELOPED BY VARIOUS TYPES OF MECHANICAL AND HAND COMPACTION HAMMERS		
<small>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</small>		
<small>5. AUTHOR(s) (First name, middle initial, last name)</small> Cecil D. Burns		
<small>6. REPORT DATE</small> September 1959	<small>7a. TOTAL NO. OF PAGES</small> 5	<small>7b. NO. OF REFS</small>
<small>8a. CONTRACT OR GRANT NO.</small>	<small>8b. ORIGINATOR'S REPORT NUMBER(S)</small> Miscellaneous Paper No. 4-357	
<small>9. PROJECT NO.</small>	<small>9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</small>	
<small>10. DISTRIBUTION STATEMENT</small> Approved for public release; distribution unlimited.		
<small>11. SUPPLEMENTARY NOTES</small>		<small>12. SPONSORING MILITARY ACTIVITY</small>
<small>13. ABSTRACT</small> The Waterways Experiment Station (WES) was requested to assemble information on mechanical hammers and to institute a test program that would permit comparison of the compaction obtained with sliding-weight and sleeve-type hand hammers. This paper presents this information and the comparative test results.		
<small>KEYWORDS:</small> Compaction equipment; Compaction (Soils); Hand tampers (Compaction)		

DD FORM 1373

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Security Classification

DOCUMENT CONTROL DATA - R.T.D.		
<small>(This form is to be filled out at the time of abstract and indexing annotation must be entered when the report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE CRITICAL ELEMENTS OF DESIGN AND CONSTRUCTION OF HEAVY-DUTY FLEXIBLE PAVEMENTS		4b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR (First name, middle initial, last name) Willard J. Turnbull		
6. REPORT DATE October 1959	7a. TOTAL NO. OF PAGES 7	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-360	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT It is believed that if proper cognizance is given to the basic design considerations discussed, as well as to the other design considerations noted in this paper, a satisfactory heavy-duty flexible pavement can be designed by utilizing the CBR method for the overall pavement and the Marshall method for the bituminous concrete. However, good equipment and construction procedures are necessary to insure that specification requirements are met and satisfactory pavements constructed. Insofar as load-carrying capacity is concerned, it is considered that flexible pavements are entirely satisfactory for the interior portions of runways of heavy-duty airfields. Further, it is believed that, exclusive of blast and fuel-spillage areas, satisfactory flexible pavements can be designed for the heavier-traffic areas of runways and taxiways. However, some additional field and laboratory research is needed in this area.		
KEYWORDS: Flexible pavement construction; Flexible pavement design (Airfields)		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

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REPORT SECURITY CLASSIFICATION

DOCUMENT CONTROL DATA - R & D		
<small>1. The classification of this, body of abstract and index, annotation must be entered when the overall report is classified.</small>		
<small>2. SPONSORING ACTIVITY (Corporate author)</small> U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		<small>3. REPORT SECURITY CLASSIFICATION</small> Unclassified
		<small>4. GROUP</small>
<small>5. REPORT TITLE</small> INVESTIGATION OF EFFECTS OF 50,000-LB WHEEL-LOAD TRAFFIC ON A SHALLOW-BURIED FLEXIBLE PIPE		
<small>6. DESCRIPTIVE NOTES (Type of report and inclusive dates)</small>		
<small>7. AUTHOR(S) (First name, middle initial, last name)</small> Loren M. Womack Richard G. Ahlvin		
<small>8. REPORT DATE</small> November 1959	<small>9a. TOTAL NO. OF PAGES</small> 14	<small>9b. NO. OF REFS</small>
<small>10. CONTRACT OR GRANT NO.</small>	<small>11. ORIGINATOR'S REPORT NUMBER(S)</small> Miscellaneous Paper No. 4-364	
<small>12. PROJECT NO.</small>	<small>13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</small> AD A006 522	
<small>14. DISTRIBUTION STATEMENT</small> Approved for public release; distribution unlimited.		
<small>15. SUPPLEMENTARY NOTES</small>		<small>16. SPONSORING MILITARY ACTIVITY</small>
<small>17. ABSTRACT</small> The tests reported herein are part of a general study of pipe action under load. The study includes model analysis of the many variables and conditions pertaining to the problem, and prototype testing to help translate results from the model studies to full-scale design criteria for drainage-pipe installations beneath airfield facilities and roads. The tests being reported were directed particularly toward assessing the effect on a shallow-buried, flexible pipe of repeated passage of a heavy wheel load simulating an aircraft landing gear.		
KEYWORDS: Corrugated metal pipes; Flexible pipes; Traffic loads		

DD FORM 1378

USE PREVIOUS EDITIONS FOR ARMY USE.

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DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
TRAFFIC EVALUATION TESTS OF ROGERS DRY LAKE, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Loren M. Womack		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1959	17	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-365	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT A portion of the unsurfaced runways of Rogers Dry Lake, Edwards Air Force Base, California, was subjected to traffic applied with a test load cart having a gross weight of 280,000 lb and carried on a twin-twin gear assembly. Tire inflation pressures ranged between 275 and 325 psi. The primary objectives of traffic were to determine (a) whether the soil strength of the lake bed was adequate to support a load of this magnitude, and (b) the effect of load repetition on the load-carrying capacity of the soil. It was also desired to determine the rate of pressure build-up that might be expected in tires inflated with air only and towed over a prescribed route. The traffic resulted in some settlement of the soil and also the displacement of a friable crust of varied thickness in some of the areas tested.		

DD FORM 1373 REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

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REPORT CLASSIFICATION

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION FOR SHEPPARD AIR FORCE BASE, WICHITA FALLS, TEXAS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
6. REPORT DATE November 1959		7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper No. 4-366	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District; Ft. Worth Ft. Worth, Texas	
13. ABSTRACT A visual inspection of the Sheppard AFB pavements in August 1959 showed them to be in poor to excellent condition. An appreciable amount of cracking was noted on the parking apron and on taxiways 1-5; therefore, these pavements are considered to be in poor condition. Birdbaths and a few cracks were noted in the flexible pavement on the E-W runway and the south end of the original east N-S runway; these pavements are being used as taxiways at the present time and are considered to be in fair condition. Parking-apron extensions I, II, and III are considered to be in good condition with only minor cracking noted thereon. The west N-S runway and taxiways 6, 7, and 8 are considered to be in good condition with only a few longitudinal cracks noted along the construction joints and a slight depression on each side of the center line on the north end of taxiway 8. All pavements constructed in 1958-59 are considered to be in excellent condition.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Sheppard Air Force Base, Wichita Falls, Texas]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4b. GROUP
AIRFIELD PAVEMENT EVALUATION; ROBINS AIR FORCE BASE, WARNER ROBINS, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1959	3	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-367	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Department of Defense only; May 1974. Other requests for this document must be referred to U. S. Army Engineer District, Savannah, Georgia.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Savannah Savannah, Georgia
13. ABSTRACT A visual inspection of Robins AFB in August 1959 showed all pavements to be in excellent to fair condition. The original portland-cement concrete pavements constructed in 1942-44 on taxiways A and B (pavement designations 32 and 28) and on the AMC parking apron (pavement designations 25, 26, 27, and 33) were in fair condition with a small number of slabs containing structural defects. The AMC pavements constructed or strengthened in 1951-56 were in excellent condition. The 37.5-ft-wide shoulders on each side of taxiways 1, 2, 3, and 6 (pavement designations 9, 16, and 18), which had been overlaid with a transition section of asphaltic concrete varying in thickness from 2 to 8 in., contained reflection cracks from the joints of the underlying portland-cement concrete pavement. The reflection cracks appeared not to have reached the surface where the asphaltic concrete became approximately 6 in. thick. The newly constructed SAC pavements also were in excellent condition. Each of five slabs, located on taxiway 7 and the operational apron, contained an uncontrolled transverse crack. In general, the pavements necessary for operation of the field contained no defects that would hinder normal aircraft operations.		
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Robins Air Force Base, Warner Robins, Ga.]		

DD FORM 1-73

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2b. GROUP		
3. REPORT TITLE		
STUDY OF LATERAL DISTRIBUTION OF AIRCRAFT TRAFFIC ON RUNWAYS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1960	8	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-369	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This report describes and gives the results of a study conducted to obtain information on the lateral distribution of the traffic of B-47, B-52, KC-97, and KC-135 type aircraft on runways during take-offs and landings. The airfields at which the traffic-distribution survey was made were Dyess, Altus, McCoy (formerly Pinecastle), MacDill, Home- stead, Loring, and Castle Air Force Bases. All runways were 200 or 300 ft wide except the one at MacDill AFB which was 500 ft wide.		
KEYWORDS: Aircraft loads; Runways; Traffic distribution		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R.E.D.		
1. ORIGINATING ACTIVITY (Corporate authority)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
NONDESTRUCTIVE TESTING OF PAVEMENTS		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR (First name, middle initial, last name)		
Audley A. Maxwell		
7. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1960	10	6
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-373	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This paper presents the results of tests made with the Shell road vibration machine which furnish some measure of the accuracy of the method and some indications of its potential usefulness and limitations. The machine and the method of operation have been described fully in the papers in the list of references, and only the basic elements will be discussed in this paper.		
KEYWORDS: Nondestructive tests; Pavement deflection; Pavements; Vibration response tests; Vibrators		

DD FORM 129, 1 JAN 60

REPLACES DD FORM 129, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Scientific Classification

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Reese Air Force Base, Lubbock, Texas]

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; JAMES CONNALLY AIR FORCE BASE, WACO, TEXAS, AND APPENDIX A: STUDIES MADE FOR EVALUATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR (First name, middle initial, last name)		
6. REPORT DATE January 1960	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. 8b. PROJECT NO. 8c. 8d.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-376 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Ft. Worth Ft. Worth, Texas
13. ABSTRACT The purpose of this report is to bring the evaluation of James Connally Air Force Base up to date by evaluation of the pavements constructed there since 1956. These pavements (which were constructed in 1959 under the supervision of the U. S. Army Engineer District, Fort Worth) consist of an 1800-ft extension to the north end of N-S runway 2, the north perimeter taxiway, the north connecting taxiway, the warm-up apron designated north warm-up apron No. 2, and the 1000-ft-long overrun and blast area located at each end of N-S runway 2. This is a final report revising the previous James Connally AFB evaluation report dated May 1958.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [James Connally Air Force Base, Waco, Texas]		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
AIRFIELD PAVEMENT EVALUATION; HUNTER AIR FORCE BASE, SAVANNAH, GEORGIA, AND APPENDIX A: STUDIES MADE FOR EVALUATION		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
6. AUTHOR(S) (First name, middle initial, last name)		
7. REPORT DATE		
February 1960		
8. CONTRACT OR GRANT NO.		
9. PROJECT NO.		
10. TOTAL NO. OF PAGES		
2		
11. NO. OF REFS		
12. ORIGINATOR'S REPORT NUMBER(S)		
Miscellaneous Paper No. 4-379		
13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
14. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; May 1974. Other requests for this document must be referred to U. S. Army Engineer District, Savannah, Georgia.		
15. SUPPLEMENTARY NOTES		
16. SPONSORING MILITARY ACTIVITY		
U. S. Army Engineer District, Savannah Savannah, Georgia		
17. ABSTRACT		
The purpose of this report is to bring the evaluation of the airfield pavements at Hunter Air Force Base up to date by evaluation of the pavements constructed there since 1956. These pavements (which were constructed in 1957 and 1959 under the supervision of the U. S. Army Engineer District, Savannah, and the Installation Engineer Office at Hunter AFB) consist of taxiway 6 and the alert taxiway and aprons, and repairs to taxiway 5 and the runway (sta 0+00 to 105+00). This is a final report revising the previous Hunter AFB evaluation report dated April 1958.		
18. KEYWORDS		
Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Hunter Air Force Base, Savannah, Georgia]		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 55, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORGANIZING ACTIVITY (Corporate authority)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE SUMMARY OF RESULTS OF COMPACTION STUDIES CONDUCTED BY ROAD RESEARCH LABORATORY, ENGLAND		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns		
6. REPORT DATE February 1960	7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-380	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This paper summarizes the results of compaction studies conducted by the Road Research Laboratory, Harmondsworth England. The Road Research Laboratory has been engaged in a comprehensive soil compaction research program since 1945. The compaction studies have been conducted under controlled conditions and have utilized most types of compaction equipment available to the engineer in the British Isles. All tests have been made on the same range of soils using the same test techniques so that direct comparisons can be made between the performance of the various types of plant.		
KEYWORDS: Compaction (Soils); Soil mechanics laboratories; [Harmondsworth, England, Road Research Laboratory]		

5010-1073

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

EXPERIMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate authority)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2b. GROUP		
3. REPORT TITLE		
EVALUATION TESTS OF EPON-ASPHALT PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Alfred H. Joseph		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1960	14	
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-388	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Since the Corps of Engineers has an active program for investigating and preparing guide specifications for new materials designed to produce pavements that will satisfactorily withstand jet aircraft operations, arrangements were made for Waterways Experiment Station (WES) personnel to observe the placement of and perform certain tests on the epoxy resin-asphalt overlay at Homestead AFB. This report describes these observations and tests.		
KEYWORDS: Epoxy asphalt concrete; Flexible pavement performance and evaluation (Airfields); Flexible pavements; Jet blast resistant materials; Jet fuel resistant materials; Overlays (Pavements); [Homestead Air Force Base, Florida]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

REPORT SECURITY CLASSIFICATION

Unclassified

Security Classification

M.P

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
-U- S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
SGRENGTH REQUIREMENTS IN UNSURFACED SOILS FOR AIRCRAFT OPERATIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Willard J. Turnbull Audley A. Maxwell Cecil D. Burns		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1960	14	4
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
a. PROJECT NO.		Miscellaneous Paper No. 4-394
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
This paper describes the development and validation of criteria for determining soil-strength requirements in unsurfaced soils for operation of aircraft.		
KEYWORDS: Soil strength; Subgrades; Traffic tests; Unsurfaced airfields		

DD FORM 1473

NOV 66 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. SPONSORING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12. REPORT SECURITY CLASSIFICATION Unclassified
2. REPORT TITLE		
PRELIMINARY INVESTIGATION OF A FIBER-RESIN DEPOSITOR FOR EXPEDIENT GROUND SURFACING		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR (First name, middle initial, last name) Robert Turner		
6. REPORT DATE July 1960	7a. TOTAL NO. OF PAGES 10	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-396	
8b. PROJECT NO. Subproject Nos. 8-70-03-400 and 8-70-03-460	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Three separate areas of soil subgrade were surfaced with a reinforced-plastic laminate produced by spraying one-third chopped glass fibers and two-thirds resin directly on the ground and compressing the material with a roller into dense laminates which cured to a rigid state in a few hours. In one area, a 14-degree slope of natural soil was covered with laminate and subjected to the heat and blast of a F-84 jet engine. In the other two areas, prepared subgrades with surface CBR's of 4 and 40 were subjected to traffic of a 50,000-lb single-wheel load with tire pressure of 200 psi and of a 10,000-lb single-wheel load with tire pressure of 100 psi, respectively. The various plastic laminates (a) withstood satisfactorily the combined effects of heat and blast from the jet engine operated at full power for a total of two minutes, (b) sustained three coverages of the 50,000-lb wheel load and failed on the fourth coverage, and (c) sustained 2000 coverages of the 10,000-lb wheel load. Based on results of these preliminary tests, it is concluded that the use of a fiber-resin depositor to spray reinforced plastic directly on a subgrade to provide an expedient surfacing on military airfields, roads, and missile sites is feasible. It is recommended that laboratory and engineering tests be conducted to establish conclusively the capabilities and limitations of this method of providing expedient surfacing.		
KEYWORDS: Expedient surfacings; Fiber reinforced plastics; Resins (Synthetic); Traffic tests		

DS 100-1-7/3

REPLACES DD FORM 147, 1 JAN 61, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; PERRIN AIR FORCE BASE, SHERMAN, TEXAS, AND APPENDIX A: STUDIES MADE FOR EVALUATION			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
6. REPORT DATE June 1960		7a. TOTAL NO. OF PAGES 3 and 15	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-397	
b. PROJECT NO.		9b. OTHER REPORT NUM(S) (Any other numbers that may be assigned this report)	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Ft. Worth Ft. Worth, Texas	
13. ABSTRACT A visual inspection of Perrin AFB in February 1960 showed the general condition of the pavements to range from poor to excellent. The general condition of each individual facility is given in fig. 4. Longitudinal cracks and a few transverse cracks were noted in the asphaltic concrete of both H-S runways and on the taxiways. Most of the longitudinal cracks were along the construction joints in the asphaltic concrete. In areas where severe cracking had occurred, the asphaltic concrete had been removed and replaced with new asphaltic concrete. The patched areas appeared to be satisfactory at the time of the inspection. The portland-cement concrete on the ends of the west H-S runway appeared to be in good condition. The new portland-cement concrete on the parking apron and on the aircraft weapons calibration facility was in excellent condition.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Perrin Air Force Base, Sherman, Texas]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>1. Source of classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small> <small>2. Do not use a term "SECRET" (proprietary author)</small>		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12. REPORT SECURITY CLASSIFICATION Unclassified 13. GROUP
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; WEBB AIR FORCE BASE, BIG SPRING, TEXAS, AND APPENDIX A: STUDIES MADE FOR EVALUATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (first name, middle initial, last name)		
6. REPORT DATE June 1960	7a. TOTAL NO. OF PAGES 3 and 14	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. b. PROJECT NO. c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper 4-398 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Ft. Worth Ft. Worth, Texas
13. ABSTRACT A visual inspection of Webb AFB in February 1960 showed the pavements to be in fair to excellent condition. The majority of the cracking appeared to be occurring along the construction joints in the asphaltic concrete. Both longitudinal and transverse cracks were noted on the west N-S runway, and the remainder of the flexible pavement on the west N-S runway and the flexible pavement on the east N-S runway are considered to be in good condition. Longitudinal cracking was noted along the construction joints on the flexible pavement taxiways. At the time of the February 1960 inspection, the cracks in the flexible pavement had been routed and sealed with a joint sealing material. Shrinkage cracks and some corner breaks were noted in the portland-cement concrete pavements that had been constructed in 1942. All other portland-cement concrete pavements appeared to be in excellent condition.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Webb Air Force Base, Big Spring, Texas]		

22 NOV 1973
 DECLASSIFIED BY 7004 1473, 1 JAN 04, WHICH IS
 OBSOLETE FOR ARMY USE.

Unclassified
 Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATOR'S ACTIVITY (Corporate authority)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		
ARMY AIRFIELD PAVEMENT EVALUATION; LAWSON ARMY AIRFIELD, FORT BENNING, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1960	3	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-411	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 328	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Savannah Savannah, Georgia
13. ABSTRACT A visual inspection of Lawson Field in March 1960 showed the pavements to be in poor to excellent condition. The portland-cement concrete pavements that were 6 in. thick, had cracked badly, and the cracks had been sealed. Parking apron 1 extension, which was constructed of 7 in. of portland-cement concrete, was in good condition with only about 5 to 10% of the slabs containing major defects. The portland-cement concrete pavements constructed since 1956 (access aprons and wash racks) were in excellent condition. The flexible pavement on the runways and taxiways was in fair to poor condition, the asphaltic concrete surface containing numerous birdbaths, map cracks, and open construction joints. This condition appeared to be prevalent on all the flexible pavements except the NW-SE runway where open joints appeared to be the major cause of cracking. The defects are not considered severe enough at this time to impair the load-carrying ability of the pavements. At the time of this survey, the asphaltic concrete surface had not been placed on the heliport parking areas or taxiway 8 extension.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Lawson Army Airfield, Fort Benning, Georgia]		

DD FORM 173

REPLACES DD FORM 173, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		
REPORT SECURITY CLASSIFICATION		Unclassified
GROUP		
REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION; REESE AIR FORCE BASE AUXILIARY AIRFIELD, TERRY COUNTY, TEXAS, AND APPENDIX A: STUDIES MADE FOR EVALUATION		
DESCRIPTIVE NOTES (Type of report and inclusive dates)		
AUTHOR(S) (First name, middle initial, last name)		
REPORT DATE	TOTAL NO. OF PAGES	NO. OF REFS
April 1961	2	
CONTRACT OR GRANT NO.	ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-427	
PROJECT NO.	OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 310	
DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
SUPPLEMENTARY NOTES	SPONSORING MILITARY ACTIVITY	
	U. S. Army Engineer District, Fort Worth Fort Worth, Texas	
<p>ABSTRACT A visual inspection was made of the facilities in January 1961. No visual defects were noted in the surface of the pavement except where the rigid pavement and the flexible pavement joined. Reflection cracks were noted in the asphaltic concrete over each joint in the underlying portland-cement concrete slabs, and these cracks extended the entire length of the buried slab (10 ft). However, since these cracks appear only in a very small area of the pavement and do not affect the load-carrying capacity thereof, all the pavement is considered to be in excellent condition.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Reese Air Force Base Auxiliary Airfield, Terry Co., Texas]</p>		

DD FORM 1-72

REPLACES DD FORM 1-72, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE

Unclassified

Security Classification

SECURITY CONTROL DATA - R & D		
<small>Of source classification of title, nature of abstract, and indexing information must be entered when the overall report is classified.</small>		
1. ORIGINATING AGENCY (Department/author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified 3. GROUP
4. REPORT TITLE INTERIM REPORT OF EXPERIMENTAL CRACK SEALING IN ASPHALIC CONCRETE PAVEMENTS, THULE AIR BASE, GREENLAND, 8-24 AUGUST 1960		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
7. REPORT DATE July 1961	7a. TOTAL NO. OF PAGES 12	7b. NO. OF REFS
8. CONTRACT OR GRANT NO. 9. PROJECT NO. 10.	11. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-436 12. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
13. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
14. SUPPLEMENTARY NOTES		15. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Eastern Ocean
16. ABSTRACT The primary purpose of the experimental crack sealing discussed herein was to determine the performance of various sealing compounds under severe arctic conditions. It was also desired to determine the effects of variations in width, depth, and shape of cut when preparing the cracks for sealing, and also the difficulties and approximate costs involved.		
KEYWORDS: Arctic regions; Flexible pavement maintenance; Sealing compounds; [Thule Air Base, Greenland]		

DD FORM 1-73

REPLACES DD FORM 127, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of this form of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
EFFECT OF HEAVY WHEEL LOADS ON 12-IN.-DIAMETER RIGID PIPE UNDER VARIOUS DEPTHS OF COVER		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE		
August 1961		
7a. TOTAL NO. OF PAGES		
15		
7b. NO. OF REFS		
8a. CONTRACT OR GRANT NO.		
8b. ORIGINATOR'S REPORT NUMBER(S)		
Miscellaneous Paper No. 4-440		
9a. PROJECT NO.		
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		
12. SPONSORING MILITARY ACTIVITY		
13. ABSTRACT		
<p>In order to develop design criteria for drainage pipe installations beneath airfield facilities and roads, six sections of 12-in.-diameter standard-strength clay pipe were installed under soil layers ranging from 12 to 42 in. in thickness, and traffic-tested with 25- and 50-kip, 100-psi-tire pressure, single-wheel loads. In addition, seven sections of pipe were subjected to load tests in the laboratory to determine their crushing strength. The tests indicate that current cover requirements are conservative. About 12 in. of cover is adequate to protect the pipe from a 25-kip load and about 27 in. from a 50-kip load. Also, a loading substantially more severe than that required to crack a rigid pipe is required to crush it. On the other hand, a pipe partially or initially cracked by overloading can be further cracked by application of a substantially smaller load than that causing the initial cracking.</p>		
KEYWORDS: Clay tile pipes; Drainage pipes; Pipe cover		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		1a. REPORT SECURITY CLASSIFICATION Unclassified 1b. GROUP
2. REPORT TITLE AIRFIELD PAVEMENT EVALUATION; CONDITION SURVEY OF NE-SW RUNWAY AND PARALLEL TAXIWAY, FOSS FIELD, SIOUX FALLS, SOUTH DAKOTA		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(S) (First name, middle initial, last name)		
5. REPORT DATE September 1961	7a. TOTAL NO. OF PAGES 12	7b. NO. OF REFS
6a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 1-451	
6b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
6c.		
6d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The U. S. Army Engineer Waterways Experiment Station (WES was requested to conduct a condition survey of the existing flexible pavements on the runway and taxiway and to make recommendations for resurfacing them. The field test program for the runway and parallel taxiway had been established by representatives of the Omaha District and the WES on a prior inspection of the pavements. Description of pavements, field testing and sampling, and test results are given.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Foss Field, Sioux Falls, South Dakota]		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATOR'S REPORT NUMBER(S)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
GROUND FLOTATION REQUIREMENTS FOR AIRCRAFT LANDING GEAR		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
7. REPORT DATE	8. TOTAL NO. OF PAGES	9. NO. OF REFS
December 1961	10	6
10. CONTRACT OR GRANT NO.	11. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-459	
12. PROJECT NO.	13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 620 312	
14. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
15. SUPPLEMENTARY NOTES		16. SPONSORING MILITARY ACTIVITY
17. ABSTRACT: This paper presents curves which can be used to select landing gear characteristics that will provide support of a given aircraft load without overloading an airfield of stated strength. Six classes of airfields are defined to which the curves presented specifically apply.		
KEYWORDS: Aircraft; Airfields; Ground flotation; Landing gear; Requirements		

10. NOV 1972 REPLACES DD FORM 173, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

SECURITY CONTROL DATA - R & D		
Complete classification of title, body of abstract and index information must be entered when the overall format is classified.		
1. ORIGINATING AGENCY (In separate summary)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		3a. GROUP
CONSTRUCTION OF EPOXY-ASPHALT CONCRETE PAVEMENT, PATRICK AIR FORCE BASE, FLORIDA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1962	8	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-466	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 306	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT: During the period 20-23 October 1961, 11,000 sq yd of epoxy-asphalt concrete pavement, approximately 1 in. thick, was placed at Patrick Air Force Base, Cocoa, Fla. The job-mix formula for the paving mixture was prepared by the Waterways Experiment Station, and personnel of WES observed the pavement construction. This report presents a brief résumé of the paving operations.		
KEYWORDS: Epoxy-asphalt concrete; Flexible pavement construction; Flexible pavements; [Patrick Air Force Base, Florida]		

DD FORM 173

REPLACES DD FORM 173, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

M.P.

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate authority)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
DISTRIBUTION OF STRESSES ON AN UNYIELDING SURFACE BENEATH A PNEUMATIC TIRE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Freitag, D. R. Green, A. J.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1962	19	0
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO. 8S70-05-001, Trafficability and Mobility Research c. Subproject -03, Mobility Fundamentals and Model Studies d.	Miscellaneous Paper No. 4-469	
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES Presented at Annual Meeting of Highway Research Board, Washington, D. C., January 1962; published in H.R.B. Bulletin 342.		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers Washington, D. C. 20314
13. ABSTRACT		
<p>A basic understanding of how soft, yielding soils support and provide traction to wheeled and tracked vehicles must be developed. One phase of the research being conducted at the U. S. Army Engineer Waterways Experiment Station to acquire this knowledge is concerned with the distribution of stresses induced by a pneumatic tire in the medium on which it operates. It includes the measurement of stresses at the interface between the tire and the surface that supports it and at locations within a yielding mass of soil. This paper describes results obtained from that portion of the research dealing with the interface stresses beneath a pneumatic tire on an unyielding surface.</p>		
KEYWORDS: Pavements; Pneumatic tires; Stresses under wheels; Tire-pavement interaction		

DD FORM 1 NOV 61 1473

REPLACES DD FORM 1073, 1 JAN 61, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Date of classification of this form of document and indexing notation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CRITICAL PROBLEMS AFFECTING QUALITY OF HEAVY-DUTY FLEXIBLE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Willard J. Turnbull		
6. REPORT DATE February 1962	7a. TOTAL NO. OF PAGES 15	7b. NO. OF REFS 12
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-470	
9a. PROJECT NO.		
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The purpose of this paper is to point out those factors in flexible pavement design and construction that are most critical and often overlooked. Only engineering phases are discussed. No attempt will be made to point out detailed remedies. It is believed that in each case there are practical and economical ways and means of overcoming the critical problems. Corps of Engineers criteria for roads and streets have recently been revised to permit treatment of heavy loads and high traffic intensities. The following items are discussed specifically: route selection; fills, cuts, and transitions, backfills; subgrade; subbase; shoulders; base; and bituminous wearing surface. In addition, critical problems associated with more general features are discussed.		
KEYWORDS: Flexible pavement construction; Flexible pavement design (Highways)		

DD FORM 10, 7/5

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Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate authority)		12. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		13. GROUP
FEASIBILITY STUDY OF THE GYRATORY MACHINE FOR TESTING SOILS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
John L. McRae Alvin R. McDaniel		
6. REPORT DATE	74. TOTAL NO. OF PAGES	75. NO. OF REFS
February 1962	15	
34. CONTRACT OR GRANT NO.	54. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 3-474	
b. PROJECT NO.	55. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Initial efforts with the gyratory machine were devoted primarily to developing it for use in testing bituminous paving mixtures. It was apparent from the beginning, however, that the machine would also be especially well suited for testing soils. Consequently, work has been initiated to develop the machine for use in soil testing, and early indications are highly promising. The tests reported herein were of a preliminary nature, serving only to permit a feasibility study of, and as background for a comprehensive investigation program on the use of the gyratory machine for soil testing.		
KEYWORDS: Gyratory compaction tests; Gyratory testing machines		

DD FORM 1373
1 NOV 61

REPLACES DD FORM 1373, 1 JAN 61, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Classification of title, body of abstract and index annotation must be entered when the report is classified.)</small>		
1. ORIGINATING ACTIVITY (Disputee author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE LOAD-CARRYING EVALUATION OF ALKALI FLAT AREA, WHITE SANDS MISSILE RANGE, NEW MEXICO		23. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Loren M. Womack		
6. REPORT DATE March 1962	7a. TOTAL NO. OF PAGES 27	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-479	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 672 493	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Parts of two proposed runways located in the alkali flat area of White Sands Missile Range were subjected to traffic applied with a test load cart having a maximum gross weight of 280,000 lb carried on a twin-twin gear assembly having a tire inflation pressure of approximately 300 psi. The primary objectives were to determine (a) the load-carrying capacity of the area in regard to current Air Force aircraft, (b) the effect of repetitive traffic, and (c) an evaluation of the area for the operation of skid-mounted vehicles. Repetitive traffic provided additional strength to the soil by compacting the loose surface sand and increasing the density in the underlying material. Comparative tests conducted at the Waterways Experiment Station with wheeled and skid-mounted vehicles having equal loads and contact pressures indicate that skids will produce more soil displacement than wheels. The magnitude of this increased severity was not completely defined by the tests. Compaction of the surface layer will substantially reduce the depth of rutting produced by wheels or skids.		
KEYWORDS: Aircraft loads; Airport runways; Traffic tests; Unsurfaced runway performance and evaluation; [White Sands Missile Range, New Mexico]		

NOV 475

REPLACES DD FORM 1475, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12. REPORT SECURITY CLASSIFICATION Unclassified
13. GROUP		
1. REPORT TITLE PRELIMINARY INVESTIGATION OF EFFECTS OF SKYDROL ON EPOXY ASPHALT CONCRETE PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns		
3. REPORT DATE April 1962	7a. TOTAL NO. OF PAGES 6	7b. NO. OF REFS
14. CONTRACT OR GRANT NO.	15. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-483	
6. PROJECT NO.	16. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
7. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.	11. SUPPLEMENTARY NOTES	
12. SPONSORING MILITARY ACTIVITY		13. ABSTRACT Representatives of the Federal Aviation Agency reported that serious deleterious action has occurred to epoxy asphalt pavements from spillage of Skydrol fluids, which are hydraulic lubricating fluids for jet engines. This report describes a brief series of tests made to investigate the detrimental effects of spillage of Skydrol fluids on epoxy asphalt concrete pavements. The investigation consisted of tests conducted in the laboratory and tests conducted on an epoxy-asphalt-concrete-pavement test section on the Waterways Experiment Station (WES) reservation.
KEYWORDS: Epoxy-asphalt concrete; Flexible pavement; Jet fuel spillage (Pavements); [Skydrol fluids]		

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & J		
<small>(The date of classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		20. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		23. GROUP
CONTROLLED TESTS OF MIXED LOADS ON FLEXIBLE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Audley A. Maxwell Richard G. Ahlvin Donald N. Brown		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1962	18	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-486	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The tests being reported here were directed at one element of the problem of mixed loads, that of occasional to frequent overloading of a flexible pavement with loads much larger than the design load. This has application both to emergency use by heavy aircraft of airfields designed for light aircraft, and to use of farm-to-market roads by heavy construction or missile-site service vehicles. These tests constitute a part of a comprehensive investigation being conducted at the U. S. Army Engineer Waterways Experiment Station relative to development of design criteria for Army airfields and heliports.</p>		
KEYWORDS: Base course; Flexible pavement performance and evaluation (Airfields); Flexible pavement performance and evaluation (Highways); Load tests (Pavements)		

DD FORM 1373, NOV 61

REPLACES DD FORM 1373, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE

Unclassified
Security Classification

<p align="center">DOCUMENT CONTROL DATA: R & B</p> <p align="center"><small>Please indicate classification of this form of abstract and its content. It must be indicated when the overall report is classified.</small></p>		
<p>1. SPONSORING ACTIVITY (plumbers industry)</p> <p>U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi</p>		<p>2a. REPORT SECURITY CLASSIFICATION</p> <p align="center">Unclassified</p> <p>2b. GROUP</p>
<p>3. REPORT TITLE</p> <p align="center">DESIGN OF FLEXIBLE PAVEMENTS CONSIDERING MIXED LOADS AND TRAFFIC VOLUME</p>		
<p>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</p>		
<p>5. AUTHOR(S) (First name, middle initial, last name)</p> <p>Willard J. Turnbull Charles R. Foster Richard G. Ahlvin</p>		
<p>6. REPORT DATE</p> <p>April 1962</p>	<p>7a. TOTAL NO. OF PAGES</p> <p align="center">12</p>	<p>7b. NO. OF REFS</p> <p align="center">5</p>
<p>8a. CONTRACT OR GRANT NO.</p>	<p>8b. ORIGINATOR'S REPORT NUMBER(S)</p> <p align="center">Miscellaneous Paper No. 4-487</p>	
<p>8c. PROJECT NO.</p>	<p>8d. OTHER REPORT NO(S) (any other numbers that may be assigned this report)</p>	
<p>10. DISTRIBUTION STATEMENT</p> <p align="center">Approved for public release; distribution unlimited.</p>		
<p>11. SUPPLEMENTARY NOTES</p>		<p>12. SPONSORING MILITARY ACTIVITY</p>
<p>13. ABSTRACT It is no longer adequate to design a pavement for a single selected load, since load repetition and various-weight loads have proved to be important considerations. There is the problem then, of what load to select as representative of the entire range of loads using our highways, from passenger vehicles to overloaded truck-trailer combinations. The Corps of Engineers has developed a revised method of thickness design for highway pavements which permits direct treatment of any range of loads or any degree or intensity of use. The purpose of this paper are to explain the essential elements of this revised method and to demonstrate its use and versatility.</p>		
<p>KEYWORDS: Flexible pavement design (Highways); Load tests (Pavements); Pavement thickness; Traffic volume (Passes)</p>		

DD FORM 1373, 1 NOV 61, 1973. REPLACES DD FORM 1373, 1 JAN 61, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

AD-A045 025

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG--ETC F/G 1/5
A BIBLIOGRAPHY WITH ABSTRACTS OF U.S. ARMY ENGINEER WATERWAYS E--ETC(U)
AUG 77 M P MEYER, V DALE
PSTIAC-5-VOL-2-PT-1

UNCLASSIFIED

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3 of 5

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A045025



Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
GYRATORY COMPACTION METHOD FOR DETERMINING DENSITY REQUIREMENTS FOR SUBGRADE AND BASE OF FLEXIBLE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
John L. McRae Alvin R. McDaniel		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1962	9	5
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
8. PROJECT NO.	Miscellaneous Paper No. 4-494	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>A new compaction procedure using the gyratory compactor is proposed for determining densities to be specified in the construction of embankments and bases for flexible pavements. The procedure now used by the Corps of Engineers, based on the AASHTO compaction test as modified by the Corps of Engineers, is not only elaborate but has proved inadequate in some instances, particularly in cohesionless soils. The proposed procedure is intended to provide for the variation in load with depth directly by using the theoretical vertical stress induced at selected depths by the design load; it is also much more simple than the present procedure. This report gives the proposed procedure and describes laboratory tests in which the procedure is used to determine the required construction density for four cohesionless materials which had previously been used in construction of two test sections. A good correlation was obtained between the gyratory-computed densities and the densities of samples obtained from the test sections after traffic had been applied. This correlation is better than that between the field densities and densities obtained with the current design procedure. Although the data are limited, the new procedure appears to show promise of providing a means of establishing compaction requirements for cohesionless materials that will result in prevention of excessive settlement in flexible pavements.</p> <p>KEYWORDS: Base courses; Flexible pavements; Gyratory compaction tests; Gyratory method design (Pavements); Subbases</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATOR (First name, middle initial, last name)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
A STUDY OF SURFACE-TYPE NUCLEAR INSTRUMENTS FOR DETERMINING SOIL MOISTURE AND DENSITY		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
Loren M. Womack		
7. REPORT DATE	8. TOTAL NO. OF PAGES	9. NO. OF REFS
May 1962	22	
10. CONTRACT OR GRANT NO.	11. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-495	
12. PROJECT NO.	13. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
14. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
15. SUPPLEMENTARY NOTES		16. SPONSORING MILITARY ACTIVITY
17. ABSTRACT The purposes of this investigation were to evaluate the accuracy, dependability, and ruggedness of the surface-type nuclear meters, and to determine if the development of these instruments is such that they may be used satisfactorily for construction control by the Corps of Engineers, particularly in the construction of airfield facilities. The investigation was divided into two major parts. The first was a laboratory program designed to determine the volume of soil surveyed by these instruments and to evaluate the accuracy of the calibration curves supplied by the manufacturer. The second part was a field study to evaluate the equipment in terms of (a) its ability to withstand the usage to which it would be subjected when placed in field service, and (b) its overall accuracy under field conditions. The laboratory phase of the investigation and a part of the field investigation were accomplished at the U. S. Army Engineer Waterways Experiment Station (WES) and are covered in this report.		
KEYWORDS: Nuclear equipment; Nuclear methods; Unit weight determination; Water content determination (Soils)		

DD FORM 1-72
1 NOV 61

REPLACES DD FORM 1-72, 1 JAN 61, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Paragraph number)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE		
TRAFFIC TESTING OF PIPE BENEATH HEAVY-LOAD RIGID PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Donald N. Brown		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1962	19	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-496	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The investigation reported herein is part of a study initiated in 1953 by the Office of the Chief of Engineers for developing adequate design criteria for minimum required depth of cover over pipe installed beneath airfield pavements, adjacent shoulders, and blast-protective surfaces. The depth of cover must be adequate to prevent failure of the buried pipe and differential settlement of the overlying pavement under both dynamic and static loads, and particularly under loads induced by high-pressure tires and current and future multiple-wheel landing gear assemblies with their increasing assembly loads. Between 1953 and 1957, the investigation was restricted to office studies and consisted of a review of previous work done in this field for the Office of the Chief of Engineers, and related work described in the technical literature. In this review, no adequately validated, rational, and acceptable empirical method was found for determining design criteria for pipe cover. It became apparent that carefully performed, large-scale prototype field tests, supplemented by model studies and theoretical calculations, would be necessary to ascertain whether improved design methods could be developed.		
KEYWORDS: Concrete pipes; Corrugated metal pipes; Load tests (Pavements); Pipe cover		

DD FORM 101-173

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE		
DEVELOPMENT OF CBR DESIGN CURVE FOR M9M2 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and Inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1962	18	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 2-4014	Miscellaneous Paper No. 4-501	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Material Center Philadelphia, Pennsylvania
13. ABSTRACT		
<p>This study was conducted to develop a CBR design curve for the M9M2 landing mat for 1600 operational cycles of an aircraft having a 17,000-lb single-wheel load and a 30-7.7 tire inflated to 400 psi. A test section consisting of items with different subgrade strengths and surfaced with the M9M2 landing mat was constructed and subjected to accelerated traffic of a 17,000-lb single-wheel load with a 26-6.6, 16-ply tire inflated to 400 psi. (A 30-7.7 tire was not available at the time of the tests, and the 26-6.6 tire, which constitutes a more severe test condition, was used.) Analysis of the data obtained indicates that the M9M2 mat will satisfactorily carry the design traffic when placed over a subgrade having a CBR of 11 or greater. The mat would probably perform satisfactorily on a subgrade of slightly lower strength (CBR of about 8 to 9) but would require a greater maintenance effort.</p>		
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; California Bearing Ratio; Subgrades; [M9M2 landing mat]		

DD FORM 129, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Mandatory)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE		13. GROUP
CONSTRUCTION AND FUEL-SPILLAGE TESTS, FIRESTONE PANELS 512 AND 510B		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
James G. Kennedy		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1955	8	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper No. 4-525	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This paper presents the results of laboratory specification tests and the results of fuel-spillage tests on field test panels constructed and tested as part of performance tests for the tar-rubber binding agent. The bituminous materials were a preblended tar-rubber product (R-512) consisting of 97 percent tar and 3 percent rubber and a latex material (R-510) which was used as an admix at the pug mill. The latex is a grayish blue liquid and is reported by the producer to contain 55 percent water and 45 percent rubber. Both products were supplied by the Firestone Tire and Rubber Company. The purpose of the test was to compare the performance of these panels with those in the original tar-rubber test section.		
KEYWORDS: Jet fuel spillage (Pavements); Rubberized tar; [512 and 510B Firestone panels]		

DD FORM 1-173

REPLACES DD FORM 1473, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - RND		
Security Classification of Data, Type of Abstract and Indexing Annotation must be entered when the overall report is classified.		
1. ORIGINATING AGENCY (purpose number)	2. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi	Unclassified	
3. REPORT TITLE		
BOMB-CRATER REPAIR STUDY, FORT BRAGG, N. C., 23 JUNE - 3 JULY 1962		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Sidney G. Tucker		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1962		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-526	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD A032 893	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		
12. SPONSORING MILITARY ACTIVITY		
13. ABSTRACT The bomb-crater study was conducted under the jurisdiction of Working Committee VI, as shown on inclosure 1 (organization chart). The purpose of the bomb-crater study was to determine the most rapid method of repairing craters in runways that would be used to support troop and cargo-type aircraft, such as the C-119, C-123, C-124, C-130, and C-133 aircraft. Rapid repair was emphasized as most essential to the success of the overall mission. The problem assumed that an airfield was captured from enemy forces and must be repaired as soon as possible to permit use of runways by troop and cargo-type aircraft. A period of two hours was selected as an acceptable time for the repair of a typical bomb crater. Repairs should be conducted with normally assigned construction equipment, and all materials, troop support, and equipment required for crater repairs must be capable of being airdropped onto the captured airfield. A work area was selected at Mackall Field so that trial tests could be conducted on several bomb craters to outline repair procedures, train field troops, and determine the most effective method of repair.		
KEYWORDS: Craters; Expedient construction; Membranes (Airfields); Military operations; [Mackall Field, Fort Bragg, N. C.]		

DD FORM 1 NOV 61 1-75

REPLACES DD FORM 1275, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		23. GROUP
GOOSE AIR BASE, LABRADOR, EPOXY-ASPHALTIC PAVEMENT PROJECT, 14 JULY - 11 AUGUST 1962		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Alfred H. Joseph		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1962	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-537	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The author visited Goose Air Base, Labrador, to observe the placement of an epoxy-asphaltic overlay pavement on the southeast end of runway 17-35. The area overlain was 200 ft wide and 500 ft long. The epoxy-asphaltic job was part of a rehabilitation project on runway 17-35 being carried out by the Corps of Engineers for the Air Force. Prior to the placement of the epoxy-asphaltic pavement considerable repair work was necessary to prepare the area. The existing pavement that was to receive the overlay consisted of two general types: approximately 50 ft on the southeast end of the area was flexible-type construction and the remainder of the area was a portland cement concrete pavement that had been overlain with asphaltic concrete. The asphaltic concrete overlay pavement was quite variable in thickness, ranging from 3 to 14 in. The overlay pavement was placed to level the portland cement concrete pavement. Repairs to the existing pavement consisted of repairing cracks and planing off 3/4 to 1 in. of the asphaltic concrete that had been badly eroded by jet aircraft.		
KEYWORDS: Asphalt overlays; Epoxy-asphalt concretes; Flexible pavement maintenance; Flexible pavements; [Goose Air Base, Labrador]		

DD FORM 1300, 1-73 (Rev. 1-73) OBSOLETE FOR ARMY USE

Unclassified

Security Classification

<p>Unclassified</p> <p>DOCUMENT CONTROL DATA - R & D</p> <p>1. U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi</p>			<p>2. REPORT SECURITY CLASSIFICATION Unclassified</p> <p>3. GROUP</p>	
<p>4. REPORT TITLE INVESTIGATION OF POSSIBLE DAMAGES TO OLE MISS AIRPORT AT OXFORD, MISS., 26 OCTOBER 1962</p>				
<p>5. DESCRIPTIVE NOTES (Type of report and inclusive dates)</p>				
<p>6. AUTHOR(S) (First name, middle initial, last name) Richard G. Ahlvin A. R. Bourquard</p>				
<p>7. REPORT DATE October 1962</p>		<p>7a. TOTAL NO. OF PAGES 3</p>		<p>7b. NO. OF REFS</p>
<p>8. CONTRACT OR GRANT NO.</p>		<p>9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-540</p>		
<p>9. PROJECT NO.</p>		<p>9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</p>		
<p>10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.</p>				
<p>11. SUPPLEMENTARY NOTES</p>		<p>12. SPONSORING MILITARY ACTIVITY</p>		
<p>13. ABSTRACT The request for the inspection came through Corps of Engineers' channels following submission of a claim for damages growing out of the use of the airfield by military transport aircraft. At the time of the disturbance, resulting from the admission of Negro James Meredith to the University of Mississippi, troops were moved to Oxford, Miss., by air transports that made use of the Ole Miss Airport (30 September and early October 1962). The airfield consists of a single strip, 100 by 4700 ft. running almost directly in an east-west direction. A taxiway intersects the runway about 1000 ft from the west end and connects the runway to an apron, 260 ft wide and 550 ft long, that runs to the south. The airfield was designed to sustain up to 15,000-lb single-wheel loads, and for several years it has been subject to regular traffic of Southern Airways' DC-3 aircraft having 12,000-lb single-wheel loads. Inspection of the pavements indicated the presence of cracks through-out the length of the runway and in a portion of the taxiway adjacent to the runway. Cracking was not found in the apron and adjacent portion of the taxiway. It must be concluded that the military transport aircraft using the Ole Miss Airport caused significant structural damage to the pavements. Corrective measures might range from limited repair of severely damaged areas plus a surface seal coat over the entire runway and taxiway to removal of pavement, reworking of base material, and repaving.</p> <p>KEYWORDS: Airports; Flexible pavement performance and evaluation (Airfields); Pavement cracking; [Oxford, Miss. airport]</p>				

DD FORM 173
1 NOV 61

REPLACES DD FORM 173, 1 JAN 61, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE VISIT TO FORT BRAGG, N. C., AND CHARLESTON AFB, S. C., 17 OCTOBER 1962			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Sidney G. Tucker			
6. REPORT DATE November 1962		7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-545	
a. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.			
d.			
10. DISTRIBUTION STATEMENT for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT Purposes of the visits were: (a) Discuss and illustrate the use of the cone and airfield cone penetrometers. (b) Inspect the T12 neoprene-coated nylon-membrane-surfaced helicopter landing pad at Simmons Army Airfield. (c) Obtain airfield cone-penetrometer readings and moisture-content and density samples from the test area at Simmons Army Airfield. (d) Deliver four cone penetrometers to the XVIII Airborne Corps Engineer Officer for training purposes. KEYWORDS: Airfield cone penetrometer; Helicopter landing pads; Membranes (Airfields); [Charleston Air Force Base, South Carolina; Simmons Army Airfield; T12 membrane]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
2. REPORT TITLE EVALUATION OF AIRSTRIP AT BINH HUNG, SOUTH VIETNAM		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Rula, A. A.			
6. REPORT DATE February 1963	7a. TOTAL NO. OF PAGES 26	7b. NO. OF REFS 0	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-549		
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
c. ARPA Order No. 400	AD 908 325L		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government Agencies only; foreign information; 28 March 1974. Other requests for this document must be referred to U. S. Army Materiel Command (ARPA-T10).			
11. SUPPLEMENTARY NOTES Service agent: U. S. Army Materiel Command Washington, D. C. 20315		12. SPONSORING MILITARY ACTIVITY Advanced Research Projects Agency Washington, D. C. 20315	
13. ABSTRACT This report presents (a) and evaluation of an unsurfaced airstrip at Binh Hung, South Vietnam, and (b) several proposed designs which would permit operation of Caribou aircraft on the airstrip.			
KEYWORDS: Tropical regions; Unsurfaced runway performance and evaluation; [South Vietnam]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
IMPORTANT CONSIDERATIONS RESULTING FROM CORPS OF ENGINEERS' FLEXIBLE PAVEMENT EXPERIENCE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Willard J. Turnbull Audley A. Maxwell Richard C. Ahlvin		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1963	16	11
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-550	
9a. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The purpose of this paper is to point out those factors in flexible pavement design and construction that have been indicated by Corps of Engineers' research and experience to be more critical and often overlooked. No attempt is made to treat all critical problems of flexible pavement design and construction or to point out detailed remedies, but there do appear to be practical and economical ways and means of overcoming the critical problems.		
KEYWORDS: Flexible pavement construction; Flexible pavement design (Airfields); Flexible pavement design (Highways)		

DD FORM 1375
1 NOV 62

1. UNCLASSIFIED FOR 1 JAN 63, 1 JAN 63, WHICH IS
03030272 FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<i>(The date classification of title, body of abstract and indexing annotation must be agreed when the overall report is classified.)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		12. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		13. GROUP
2. REPORT TITLE		
IMPORTANCE OF COMPACTION AND QUALITY OF CRUSHED-STONE BASES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Willard J. Turnbull Richard G. Ahlvin		
6. REPORT DATE	72. TOTAL NO. OF PAGES	73. NO. OF REFS
February 1963	10	
34. CONTRACT OR GRANT NO.	52. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper No. 4-559	
c.	63. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This paper concerns primarily the compaction phenomenon, although the combined effects of shear and compaction in producing undesirable settlement are mentioned. Base-course quality is briefly discussed, as are also several other factors pertinent to successful behavior of flexible pavement base courses under heavy traffic of heavy loads.		
KEYWORDS: Base courses; Compaction (Soils); Crushed stone		

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

UNCLASSIFIED		
DOCUMENT CONTROL DATA - R & D		
(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING AGENCY (Alphanumeric number)	2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi	Unclassified	
3. REPORT TITLE		2b. GROUP
VISIT TO FORT CAMPBELL, KY., TO CONSTRUCT T15 MEMBRANE-SURFACED RUNWAY AND HELICOPTER LANDING PAD, 17-24 SEPTEMBER 1962		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Sidney G Tucker		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1963	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-565	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT Three ultrasonic-sealed membrane surfaces were provided for test purposes at Fort Campbell. Two of the surfaces designed for use on pioneer-type runways were 56 ft wide and 1200 ft long, and the other surface designed for use on a pioneer-type helicopter landing pad was 156 ft square. These surfaces consisted of laminated vinyl-nylon membrane strips, approximately 65 in. wide, joined with 1-in. ultrasonic-sealed lap joints. These surfaces were shipped in wooden crates from the WES to Fort Campbell; however, for weight-saving purposes, the wooden crates were removed from the surfaces prior to rigging them for airdropping.		
KEYWORDS: Helicopter landing pads; Membranes (Airfields); Runways; [Fort Campbell, Ky.; T15 membrane]		

DD FORM 1-75

UNCLASSIFIED FOR RELEASE JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing association must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Mandatory author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
EVALUATION OF M9M1 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
WILLIAM B. FENWICK		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1963	20	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 2-4014	Miscellaneous Paper No. 4-581	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A006 530	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Material Center Philadelphia, Pennsylvania
13. ABSTRACT		
<p>This study was conducted to develop a CBR design curve for subgrades to be surfaced with M9M1 landing mat to withstand 1600 taxiing cycles of an aircraft with 17,000-lb single-wheel load on a 30-7.7 tire inflated to 400 psi. A test section consisting of several items with different subgrade strengths (CBR ranging from 9 to 65) and surfaced with the M9M1 landing mat was constructed and subjected to accelerated traffic of a 17,000-lb single-wheel load with a 26-6.6 tire inflated to 400 psi. (A 30-7.7 tire was not available at the time of the tests, and the 26-6.6 tire, which constitutes a more severe test condition, was used.) Analysis of the data indicates that the M9M1 mat will not withstand traffic of the 17,000-lb load regardless of subgrade strength. Severe weld breakage and rivet shearing occurred during the first few coverages of the wheel load. The mat would probably perform satisfactorily under smaller loads (not exceeding 12,000 lb) and particularly with lower tire pressures. It is recommended that use of continuous welds rather than spot welds, steel rather than aluminum rivets, and solid aluminum plates welded or riveted to the bottom of the mat be investigated as possible aids in improving mat performance.</p>		
KEYWORDS: Aluminum landing mats; California Bearing Ratio; [M9M1 landing mat]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

UNCLASSIFIED SECURITY CLASSIFICATION		
DOCUMENT CONTROL DATA - R 10		
1. ORIGINATING ACTIVITY (Department number)		
U. S. Army Engineer Center Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE DEVELOPMENT OF CBR DESIGN CURVES FOR AML LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns William B. Fenwick		
6. REPORT DATE September 1963	7a. TOTAL NO. OF PAGES 40	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-599
b. PROJECT NO. 2-4036 and 3-4007		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 749 993
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Material Center Philadelphia, Pennsylvania
13. ABSTRACT The preliminary objective of the investigations reported herein was to evaluate the performance of the four experimental Fenestra Mark III mats under accelerated traffic tests with single-wheel loads of 17,000, 27,000, and 39,000 lb with 400-psi tire pressures. Tests with the 17,000-lb single-wheel load were included to provide a comparison of performance of the Fenestra mats with previous mats tested with the 17,000-lb single-wheel load. The primary objective of the investigations was to develop CBR design curves for the most satisfactory Fenestra Mark III mat, later designated AML, and the Butler AML mat. The CBR design curves were to indicate the minimum strength required for subgrades surfaced with the AML mat to support 1600 cycles of aircraft operations with 27,000- and 39,000-lb single-wheel loads with 400-psi tire pressures.		
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; California Bearing Ratio; [AML landing mat]		

1. NOV 1963 1775
 2. NOV 1963 1775
 3. NOV 1963 1775

UNCLASSIFIED
 SECURITY CLASSIFICATION

DOCUMENT CONTROL DATA - R E D		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		
REPORT SECURITY CLASSIFICATION		Unclassified
REPORT TITLE		
IMPROVED BEACH MATTING TESTS AT ONSLOW BEACH, N. C., 20-25 MAY 1963		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Sidney G. Tucker		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1963	13	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-602	
9a. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 749 994	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
<p>13. ABSTRACT Initially, an overall review of previous investigations of beach matting was conducted at the WES, and engineer field tests were performed on both the woven-wire steel beach matting and those items that showed promise of accomplishing most of the desired requirements. Those items that proved most successful in tests at the WES were selected for additional testing at Onslow Beach to determine their suitability for placement by troops of a pioneer-type engineering battalion and to determine the capability of the materials for improving the trafficability across sand beaches as far as wheeled vehicles are concerned. Four materials were procured by the WES for tests at Onslow Beach: 1-1/8-in.-square mesh woven-nylon netting constructed with type A, No. 84, continuous nylon filament twine; 4-in.-square mesh cargo netting constructed with 5/8-in. diameter polypropylene rope. All ropes were interwoven to prevent slippage of one over the other; vinyl-laminated nylon-coated fabric electronically sealed into a surfacing 20 ft 4 in. wide and 120 ft 4 in. long; and neoprene-coated nylon-duck fabric sewn into sections that were 12 ft wide and 50 ft long.</p> <p>Beac KEYWORDS: Beach trafficability; Fabrics; Ground matting; Prefabricated surfacings; [Onslow Beach, N. C.]</p>		

DD FORM 175

REPLACES DD FORM 175, 1 JAN 54, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

205

Unclassified

SECURITY CONTROL DATA - R & D		
<small>(The date of classification of title, body of abstract and indexing annotation must be entered when the report is classified)</small>		
1. ORIGINATING AGENCY (Corporate authority)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
SOIL STABILIZATION REQUIREMENTS FOR MILITARY ROADS AND AIRFIELDS IN THE THEATER OF OPERATIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
6. REPORT DATE		
October 1963		
7a. TOTAL NO. OF PAGES		
19		
7b. NO. OF REFS		
20		
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 1-T-O-21701-A-046		Miscellaneous Paper No. 3-605
c. Task 05		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD 450 617
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command R&D Directorate Washington, D. C.
13. ABSTRACT The purpose of the study reported herein is to establish requirements for soil stabilization for military roads and airfields in the theater of operations based on existing operational needs for such facilities. These requirements are necessary to guide the development, evaluation, and design phases of the soil stabilization research program. From current concepts of military operations in forward areas, various classifications of roads and airfields are defined with respect to their specific operational functions and usage characteristics. Also, requirements for stabilization of these roads and airfields in terms of strength and thickness parameters to satisfy anticipated operational needs are developed on the basis of a thickness-of-layer design approach. The stabilization objectives for military purposes encompass the needs both to improve the strength of initially wet, weak soils and to waterproof and dustproof soils which possess an adequate natural strength. Maximum limits of curing time and quantity of stabilizing material to achieve the necessary stabilization objectives are also suggested to define completely the scope of the military stabilization research problem.		
KEYWORDS: Airfields; Military operations; Requirements; Roads; Soil stabilization		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
REPORT OF TRIP TO GRIFFISS AIR FORCE BASE, 7-18 October 1963			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Alfred H. Joseph			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
December 1963	4		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO.	Miscellaneous Paper No. 4-614		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.			
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT			
At the request of the North Atlantic Division (NAD), Mr. R. R. Johnson and the author visited Griffiss AFB, Rome, N. Y., to help develop an asphaltic concrete pavement mixture that would withstand traffic of a 20,000-lb assembly load with tires inflated to 275 psi. Five aggregates were utilized in preparing the blend for the mix. Four of the aggregates were crushed limestone, and the other was a fine sand. In order to obtain the coarse fraction of the aggregates for the mix, it was necessary to utilize a 1-1/2-in. maximum-size aggregate and scalp it over the 3/4-in. screen in the asphalt plant, since there was no 3/4-in. maximum-size aggregates available and the project was too small to change the crusher screens to produce the material. The total mix was less than 1400 tons. The mix was placed as a surface course. The overall pavement was considered satisfactory.			
KEYWORDS: Aggregate blending; Flexible pavement design (Airfields); [Griffis Air Force Base, Rome, N. Y.]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		13. GROUP
DEVELOPMENT OF CBR DESIGN CURVES FOR HARVEY ALUMINUM LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1964	23	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
9. PROJECT NO. 3-4019	Miscellaneous Paper No. 4-615	
10. DISTRIBUTION STATEMENT	11. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Approved for public release; distribution unlimited.	AD 749 467	
12. SUPPLEMENTARY NOTES	13. SPONSORING MILITARY ACTIVITY	
	Naval Air Material Center Philadelphia, Pennsylvania	
14. ABSTRACT This study was conducted to develop CBR design curves for an aluminum landing mat fabricated by Harvey Aluminum, Inc., Torrance, Calif. The design curves were to represent 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel main gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. CBR design curves were also desired for 1600 passes of a 39,000-lb single-wheel load applied in a single track to represent the calculated loading imposed on the landing mat during launching of the 60,000-lb aircraft by catapult. A test section consisting of five items with different subgrade materials at different strengths and surfaced with the Harvey mat was constructed and subjected to accelerated traffic of single-wheel loads ranging from 27,000 to 39,000 lb with a 30-7.7 tire inflated to 400 psi.		
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; California Bearing Ratio; [Harvey aluminum landing mat]		

DD FORM 1-77

REPLACES DD FORM 147, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE

Unclassified

Security Classification

1. ORIGINATOR'S ACTIVITY (Corporate activity) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi			20. REPORT SECURITY CLASSIFICATION Unclassified		
3. REPORT TITLE CONSTRUCTION OF MEMBRANE-SURFACED RUNWAY AND HELICOPTER LANDING PAD, FT. BENNING, GEORGIA					
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)					
5. AUTHOR(S) (first name, middle initial, last name) Sidney G. Tucker					
6. REPORT DATE February 1964		7a. TOTAL NO. OF PAGES 9		7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-620			
9. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be associated with this report) AD 749 996			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.					
11. SUPPLEMENTARY NOTES			12. SPONSORING MILITARY ACTIVITY		
13. ABSTRACT The test program described in this report was conducted to obtain factual information for use in evaluating the relative effectiveness of experimental prefabricated membranes in dustproofing and waterproofing both prepared and unprepared soil subgrades when subjected to accelerated traffic of current U. S. Army aircraft. During the period of test, pertinent data concerning the number and type of aircraft operations and the performance of membrane materials and soil subgrade were recorded so that a detailed analysis could be conducted to determine the operational suitability of the expedient surfacing.					
KEYWORDS: Helicopter landing pads; Prefabricated membranes; Runways; [Fort Benning, Ga.]					

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

<p align="center">DOCUMENT CONTROL DATA, R&D</p> <p align="center"><small>Classification of this type of document and marking must be entered when the document is received</small></p>		
<p>1. ORIGINATOR'S ACTIVITY (placename author)</p> <p>U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi</p>		<p>2. REPORT'S SECURITY CLASSIFICATION</p> <p>Unclassified</p>
<p>3. REPORT TITLE</p> <p>DEVELOPMENT OF CBR DESIGN CURVE FOR MODIFIED AM1 LANDING MAT</p>		
<p>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</p>		
<p>5. AUTHOR(S) (First name, middle initial, last name)</p> <p>Cecil D. Burns William B. Fenwick</p>		
<p>6. REPORT DATE</p> <p>June 1964</p>	<p>7a. TOTAL NO. OF PAGES</p> <p>22</p>	<p>7b. NO. OF REFS</p>
<p>8a. CONTRACT OR GRANT NO.</p>	<p>8b. ORIGINATOR'S REPORT NUMBER(S)</p> <p>Miscellaneous Paper No. 4-655</p>	
<p>9. PROJECT NO. 3-4019</p>	<p>9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</p> <p>AD 749 810</p>	
<p>10. DISTRIBUTION STATEMENT</p> <p>Approved for public release; distribution unlimited.</p>		
<p>11. SUPPLEMENTARY NOTES</p>		<p>12. SPONSORING MILITARY ACTIVITY</p> <p>Naval Air Material Center Philadelphia, Pennsylvania</p>
<p>13. ABSTRACT This investigation was conducted to develop a CBR design curve for modified AM1 landing mat fabricated by Butler Manufacturing Company, Kansas City, Missouri. The design curve was to indicate the subgrade strength required, when the subgrade is surfaced with the modified Butler AM1 mat, to withstand 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel, main-gear assembly load of 27,000-lb and a 30.00-7.7 tire inflated to 400 psi. It was also desired to test the modified AM1 mat fabricated by Fenestra, Inc., Philadelphia, Pennsylvania, in order to obtain comparative data. A test section consisting of three items with different subgrade strengths, surfaced with the Fenestra and Butler mats, was constructed and subjected to accelerated traffic of a 27,000-lb single-wheel load with a 30.00-7.7 tire inflated to 400 psi. Analysis of the data obtained indicates that the modified Fenestra and Butler AM1 mats (with end-connector bars) will satisfactorily sustain the design traffic when placed on a subgrade having a CBR of 6 or greater throughout the traffic period. However, it is considered that the overall performance of the Butler mat was somewhat more satisfactory than that of the Fenestra mat.</p>		
<p>KEYWORDS: Accelerated traffic tests; Aluminum landing mats; California Bearing Ratio; [AM1 landing mat; Butler landing mat; Fenestra landing mat]</p>		

DD FORM 173

REPLACES DD FORM 173, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

1. ORIGINATOR'S REPORT NUMBER		
U. S. Army Engineer Materiel Development Station Vicksburg, Mississippi		
2. REPORT TITLE		
EVALUATION OF CONVAIR LANDING MAT		
3. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William B. Fenwick		
4. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1964	27	
5a. CONTRACT OR GRANT NO.	5b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 3-4019	Miscellaneous Paper No. 4-656	
c.	5c. OTHER REPORT NO(S) (any other numbers that may be assigned this report)	
d.	AD 749 812	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
	Naval Air Material Center Philadelphia, Pennsylvania	
13. ABSTRACT		
<p>This investigation was conducted to evaluate airfield landing mats developed and fabricated by Convair Corporation, San Diego, Calif., and to develop CBR design curves for these mats for 1600 operational cycles (188 coverages) of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb and a 30.00-7.7 tire inflated to 400 psi. CBR design curves were also desired for 1600 passes of a 39,000-lb single-wheel load applied in a single track to represent the calculated loading to be imposed on the landing mat during the launching of a 60,000-lb aircraft by catapult. A test section consisting of five items with different subgrade strengths, surfaced with the Convair mat with laminated wood core, was constructed and subjected to accelerated traffic of 27,000- and 39,000-lb single-wheel loads with a 30.00-7.7 tire inflated to 400 psi. With the 39,000-lb wheel load, tests were made on both a single and a double layer of mat. A single layer of aluminum-core mat was also tested on one item using the same wheel loads and conditions. The data obtained were not adequate to develop the desired CBR design curves.</p>		
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; California Bearing Ratio; Wood landing mats; [Convair landing mat]		

DD FORM 13-72

USE PREVIOUS EDITIONS FOR ARMY USE

Unclassified

Security Classification

<p>U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi</p>			<p>REPORT SECURITY CLASSIFICATION Unclassified</p>
<p>REPORT TITLE PERFORMANCE OF C-130 RAMP KIT ON VARIOUS SOIL CONDITIONS</p>			
<p>DESCRIPTIVE NOTES (Type of report and inclusive dates)</p>			
<p>AUTHOR(S) (First name, middle initial, last name) William B. Fenwick</p>			
<p>REPORT DATE November 1964</p>	<p>TOTAL NO. OF PAGES 12</p>	<p>NO. OF REFS</p>	
<p>CONTRACT OR GRANT NO.</p>	<p>ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-679</p>		
<p>PROJECT NO.</p>	<p>OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 751 100</p>		
<p>DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.</p>			
<p>SUPPLEMENTARY NOTES</p>	<p>SPONSORING MILITARY ACTIVITY Wright-Patterson Air Force Base Aeronautical Systems Division Ohio</p>		
<p>ABSTRACT This report describes the test sites and soils data obtained during the evaluation of a ramp kit for unloading palletized cargo from C-130 aircraft. Tests were conducted with loads of 3000, 5000, 6500, and 10,000 lb on two types of soil, lean clay and heavy clay. Soil test pads were prepared to provide three different grades, flat and level, 1-1/2-deg longitudinal upgrade, and 5-1/2-deg transverse (twisted) slope. In addition, tests were conducted at the heavy clay test site on a pad with and 8-deg twist and on a very soft soil test pad.</p>			
<p>KEYWORDS: Cargo aircraft; Clays; Ground matting</p>			

DD FORM 173 1 NOV 61 REPLACES DD FORM 173, 1 JAN 45, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION; TURNER AIR FORCE BASE, ALBANY, GEORGIA, SEPTEMBER 1963		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1965	3	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-688	
9. PROJECT NO.		
	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 751 366	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Engineer District, Savannah Savannah, Georgia
13. ABSTRACT		
<p>A visual inspection of Turner AFB in September 1963 indicated pavement conditions to range from poor to good. The old 6-in.-thick portland-cement concrete pavements on aprons A, B, and D were in poor to failed condition. These pavements were being used by C-130, B-50, and other light-type aircraft. Taxiway C was rutted severely, and a number of failures had occurred as a result of traffic of B-52 type aircraft. Apron F had a failed area where the crossover taxiway enters the apron, and cracking and settlement were being experienced along the south edge of apron E where B-52's taxi (apron E is the maintenance apron for B-52 aircraft). Apron F is used for parking the KC-135 tankers and was not showing any appreciable deterioration. The washrack had several cracked slabs around the drop inlet. Taxiway access No. 2 was generally in good condition; a few cracks and occasional spalls were observed, but no distressed areas were apparent. Of interest on this taxiway were a number of small areas where the surface finish is being worn away and the aggregate exposed. The concrete in these areas appears to be rather susceptible to spalling and cracking, especially where these areas are in the vicinity of a joint. The NE-SW runway was generally in good condition. The worst conditions were found in the 14-in. portland-cement concrete. The new pavements constructed in 1963 were in excellent condition. The transition from the new apron taxiway to the old 6-in. apron pavements has settled in local areas; however, this is the result of tying a heavy-duty new pavement to failed existing pavement. The pavements at Turner AFB at the time of this inspection were generally in satisfactory condition, except for the old 6-in. portland-cement pavement on aprons A, B, and D and the asphaltic concrete pavement on taxiway C.</p> <p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Turner Air Force Base, Albany, Ga.]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		1a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
ARMY AIRFIELD PAVEMENT EVALUATION; ROBERT GRAY ARMY AIRFIELD, FORT HOOD, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1965	17	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-697	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 735 695	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Headquarters, III Corps and Fort Hood, Texas
13. ABSTRACT		
<p>The primary purpose of this study was to establish the allowable load-carrying capacities of the airfield pavements at Robert Gray Army Airfield (RGAA), Fort Hood, Texas. In addition, Headquarters, III Corps, and Fort Hood, Texas, requested recommendations on the following items relative to the airfield: (a) Necessary repairs or reconstruction to extend the pavement life for five years for the projected mission of the field. (b) Design pavement thickness for reconstruction if pavement is inadequate for repair. (c) Design for subdrain structures if investigation indicates that subdrains are required.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Robert Gray Army Airfield, Fort Hood, Texas]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE F5A AUSTERE FIELD TEST, LANDING STRIP EVALUATION			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) William B. Fenwick			
6. REPORT DATE August 1965		7a. TOTAL NO. OF PAGES 6	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-701	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 735 694	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Air Force Systems Command U. S. Air Force Wright-Patterson Air Force Base, Ohio	
13. ABSTRACT This report describes the test site and presents the soils data obtained in connection with a test program to evaluate the ability of F5A aircraft to operate from an austere airfield. The test site is compared in detail with a hasty airfield as defined in Department of the Army Technical Manual 5-251, <u>Army Airfields and Heliports</u> . It was concluded that: (a) Although the austere test runway did not meet all minimum requirements for a hasty airfield, it well represented a typical hasty airfield. (b) The test runway is capable of satisfactorily withstanding for six months the number of operations of F5A aircraft required to support a corps headquarters. (c) The application of water to the test runway had negligible effect on the surface CBR, but water added to a sod field with little or no vegetation due to dry weather is beneficial from the standpoint of dust control.			
KEYWORDS: Expedient construction; Landing strips; [F5A Aircraft]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE BEHAVIOR OF EPOXY-ASPHALT AIRFIELD PAVEMENTS, 1963 INSPECTIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph		
6. REPORT DATE February 1965	7a. TOTAL NO. OF PAGES 21	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-704	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
8c.	AD 735 701	
8d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Office, Chief of Engineers Washington, D. C.
13. ABSTRACT This report presents the findings of inspections made in 1963 of epoxy-asphalt pavements at 20 airfields located throughout the United States. It was concluded that: (a) Epoxy-asphalt pavements are sufficiently resistant to the action of fuel spillage and blast from jet-type aircraft to be used in areas of such spillage and blast. (b) Thin overlays of epoxy-asphalt pavement are subject to cracking; however, the cracks do not tend to spall or ravel. (c) The evaluation of the different binder formulations of the epoxy-asphalt is not conclusive; observation of the pavements will continue so that a definite evaluation can be made. (d) Climate has a direct effect on epoxy-asphalt pavements, i.e. the colder the climate, the greater the tendency for cracking.		
KEYWORDS: Epoxy-asphalt concrete; Flexible pavements		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONSTRUCTION OF FIRESTONE TAR-RUBBER TESTS PAVEMENT AT SELFRIDGE AFB, Michigan		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
William H. Larson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1964	5	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-707	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 735 847	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>The WES was requested by the Air Force to develop job-mix formulas for tar-concrete binder course, tar-rubber wearing course, and a special test installation at Selfridge AFB of tar-rubber wearing course using Firestone rubber latex. The WES was also asked to supervise construction of the Firestone test pavement. The job-mix formulas for the three mix designs were reported separately by letter to the Base Civil Engineer concerning the tar-binder course, tar-rubber wearing course and Firestone test pavement. To summarize briefly the important elements of the Firestone test pavement, the design was based on an aggregate gradation which was a blend of crushed-slag coarse aggregate, slag sand, and natural siliceous sand and 9.8 percent tar-rubber.</p>		
<p>KEYWORDS: Flexible pavement construction; Rubberized-tar pavements; [Selfridge Air Force Base, Detroit, Michigan]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE TESTS WITH A C-130E AIRCRAFT ON UNSURFACED SOILS		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Loren M. Womack			
6. REPORT DATE February 1965		7a. TOTAL NO. OF PAGES 17	7b. NO. OF REFS 5
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-712	
a. PROJECT NO.		8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD 613 170	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Air Force Systems Command U. S. Air Force Wright-Patterson Air Force Base, Ohio	
13. ABSTRACT The investigation reported herein consisted in selecting test sites, obtaining necessary soil data to evaluate the strength of the soil, and determining the effect of aircraft operations on soil strength. In addition, it was desired that sufficient information be obtained on runway topography to permit an analysis of aircraft response to runway roughness by L-G.			
KEYWORDS: Landing field site selection; Unsurfaced runway performance and evaluation; [C-130E Aircraft]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING AGENCY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE VISIT TO FT. BENNING, GA., FOR CONSTRUCTION OF FIBER GLASS MEMBRANE SURFACING, DECEMBER 1964, AND INSPECTIONS OF SURFACING, JANUARY 1965			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Sidney G. Tucker			
6. REPORT DATE February 1965		7a. TOTAL NO. OF PAGES 12	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-714	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD A032 649	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command	
13. ABSTRACT The Goodyear Aerospace Corporation, Arizona Division, Litchfield, Ariz., on its own initiative prepared and submitted to the WES a proposal for an airfield surfacing membrane system. The proposal was based on initial material development work that had been conducted previously in the laboratory and field by Goodyear, and it recommended that large-scale feasibility and development work be conducted to demonstrate the membrane's ability as a water barrier and dust cover for soil subgrades. The proposal suggested that a field-test program be conducted at Ft. Benning, Ga., and that the membrane be installed under field conditions as a runway extension so that the operational capability of the surfacing could be determined for aircraft operations. It was recommended that placement of the membrane be made with an experimental handcart furnished by Goodyear that could be towed easily by a crew of four men. After reviewing the above-described proposal, the WES recommended that a fiber glass membrane surfacing, 50 ft wide and 500 ft long, be constructed at Ft. Benning, Ga., to demonstrate the feasibility of placing the surfacing with field troops and to determine the operational suitability of the surfacing for operations of current U. S. Army fixed-wing aircraft.			
KEYWORDS: Fiber reinforced plastics; Membrane construction; Membranes (Airfields); [Ft. Benning, Georgia]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PHASE I FIELD TESTS OF T17 MEMBRANE SURFACING AND DUST PALLIATIVES; REPORT 1, FORT BRAGG, N. C., 13-15 JANUARY 1965		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Sidney G. Tucker Royce C. Eaves		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1965	14	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
A. PROJECT NO. 1-V-O-21701-A-046		Miscellaneous Paper No. 4-722, Report 1
c. Task 05		8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD A032 650
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Alexandria, Va.
13. ABSTRACT		
This memorandum describes pertinent observations, information, and data obtained during initial field testing of T17 membrane surfacing and two selected dust palliatives at Fort Bragg, N. C., from 13 to 15 January 1965.		
KEYWORDS: Dust control; Field tests; Materials; Membranes (Airfields); [Fort Bragg, N. C.; T17 membranes]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

220

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PHASE I FIELD TESTS OF T17 MEMBRANE SURFACING AND DUST PALLIATIVES; REPORT 2, DYESS AIR FORCE BASE, TEXAS 26-28 JANUARY 1965		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Richard H. Grau Royce C. Eaves		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1965	16	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-V-0-21701-A-046	Miscellaneous Paper No. 4-722, Report 2	
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 6032 651	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Alexandria, Va.
13. ABSTRACT		
This memorandum describes pertinent observations, information, and data obtained during field testing of the T17 membrane surfacing and dust palliatives at Dyess AFB, Tex., from 26 through 28 January 1965.		
KEYWORDS: Dust control; Field tests; Materials; Membranes (Airfields); [Dyess Air Force Base, Abilene, Texas; T17 membrane]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified;

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE PHASE I FIELD TESTS OF T17 MEMBRANE SURFACING AND DUST PALLIATIVES; REPORT 3, EGLIN AIR FORCE BASE, FLA., 9-26 FEBRUARY 1965			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Richard H. Grau Royce C. Eaves			
6. REPORT DATE June 1965		7a. TOTAL NO. OF PAGES 19	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-722, Report 3	
a. PROJECT NO. 1-V-O-21701-A-046		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c. Task 05		AD A032 652	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Alexandria, Va.	
13. ABSTRACT This memorandum describes pertinent observations, information, and data obtained during initial field testing of T17 membrane surfacing and two selected dust palliatives at Eglin AFB, Fla., from 9 through 26 February 1965.			
KEYWORDS: Dust control; Field tests; Materials; Membranes (Airfields); [Eglin Air Force Base, Valpariso, Florida; T17 membrane]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE PHASE 1, FIELD TESTS OF T17 MEMBRANE SURFACING AND DUST PALLIATIVES, REPORT 4, LANGLEY AIR FORCE BASE, VA., 22-26 MARCH AND 1-3 APRIL 1965			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Richard H. Grau Royce C. Eaves			
6. REPORT DATE June 1965		7a. TOTAL NO. OF PAGES 17	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-V-O-21701-A-046		Miscellaneous Paper No. 4-722, Report 4	
c. Task 05		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 706	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Alexandria, Va.	
13. ABSTRACT This report describes pertinent observations, information, and data obtained during initial field testing of the T17 membrane surfacing and two selected dust palliatives at Langley AFB, Va. This site was used, in lieu of one of the previously selected test locations (Sewart AFB, Tenn. and Fort Leonard Wood, Mo.), at the request of the Tactical Air Command.			
KEYWORDS: Dust control; Field tests; Materials; Membranes (Airfields); [Langley Air Force Base, Virginia; T17 membrane]			

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

Classify classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.

1. ORIGINATOR'S ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		1a. REPORT SECURITY CLASSIFICATION Unclassified	
		1b. GROUP	
2. REPORT TITLE EFFECT OF METHYL BROMIDE TREATMENT ON RESPONSE OF A SOIL TO STABILIZATION WITH CEMENT AND LIME			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
3. AUTHOR(S) (First name, middle initial, last name) John D. Stouffer			
4. REPORT DATE July 1965		7a. TOTAL NO. OF PAGES 5	7b. NO. OF REFS
5a. CONTRACT OR GRANT NO.		5b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-728	
b. PROJECT NO. 1-V-0-21701-A-046			
c. Task 05		5b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 736 125	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Alexandria, Virginia	
13. ABSTRACT Previous tests by the WES Army Mobility Research Branch showed no significant effect of methyl bromide treatment on the Atterberg limits of various soils but did not reveal the possible influence of the fumigation on the chemistry of the soil which might be significant to stabilization. A limited laboratory study therefore was considered necessary to clarify this aspect. The purpose of this study was to examine the influence of methyl bromide treatment of Vicksburg clayey silt (loess) on the responsiveness of the soil to stabilization with portland cement and hydrated lime.			
KEYWORDS: Cement soil stabilization; Chemical soil stabilization; Loess			

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Unclassified

Security Classification

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• Family Communication

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DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE EVALUATION OF HARVEY MODIFIED AM2 LANDING MAT		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) William B. Fenwick			
6. REPORT DATE October 1965	7a. TOTAL NO. OF PAGES 14	7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-747		
9. PROJECT NO. 4-0029	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 735 851		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Naval Air Engineering Center Philadelphia, Pennsylvania	
13. ABSTRACT This investigation was conducted to evaluate a modified end connector on the AM2 landing mat fabricated by Harvey Aluminum, Inc., Torrance, Calif. A test section, consisting of three clay subgrade items with different strengths and one sand item, was constructed and surfaced with the modified AM2 mat. The test section was subjected to traffic representing 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. Conclusions are itemized based on the results obtained in this investigation.			
KEYWORDS: Aluminum landing mats; Traffic tests; [AM2 landing mat]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12. REPORT SECURITY CLASSIFICATION Unclassified
2. REPORT TITLE		
EVALUATION OF WASHINGTON ALUMINUM COMPANY AM2 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1965	16	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 4-0029	Miscellaneous Paper No. 4-753	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 736 126	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT		
<p>This study was conducted to compare the performance of aluminum landing mat fabricated by Washington Aluminum Co., Enterprise, Ala., with that designed and fabricated by Harvey Aluminum, Inc., Torrance, Calif., which had been tested earlier and the results reported by the U. S. Army Engineer Waterways Experiment Station in Miscellaneous Paper (MP) No. 4-615. It was also desired to compare the quality of extrusions furnished Washington Aluminum Co. by Aluminum Company of America (Alcoa) and Dow Chemical Co. The Primary method of analysis was by comparison of CBR design curves which were developed from the test data to represent 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel, main-gear load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. CBR design curves were developed for the mats using flexible pavement design criteria and computing an equivalent thickness of subgrade for the mats based on the mat performance. Design curves for the mats were obtained by reducing the thickness required by the flexible pavement design curves by the amount to which the mat is equivalent. Two test sections, consisting of three items each with different subgrade materials at different strengths, each surfaced with one of the Washington Aluminum Co. extruded mats were constructed and subjected to accelerated uniform-coverage and single-track traffic by the load described above.</p>		
KEYWORDS: Aluminum landing mats; Traffic tests; [AM2 landing mat]		

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Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE GUIDE MANUAL FOR SELECTION AND USE OF DUST PALLIATIVES AND SOIL WATERPROOFERS IN THE THEATER OF OPERATIONS		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) George R. Kozan R. A. Pimental		
6. REPORT DATE November 1965	7a. TOTAL NO. OF PAGES 24	7b. NO. OF REFS 19
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-756	
b. PROJECT NO. 1-V-O-21701-A-046	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 475 186	
c. Task 05		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Alexandria, Virginia
13. ABSTRACT This manual provides interim guidance to military engineering personnel in selecting and using materials for alleviating dust and for water-proofing soils in support of operations on expedient airfields and roads in the theater of operations. The problems of dust and water pertinent to military operations on unsurfaced airfields and roads are defined, and the objectives and limitations of soil surface treatments to alleviate these problems are stated. General procedures for applying a dust palliative or soil waterproofer are outlined, and the implications of these procedures to the ultimate selection of a material are presented. Various types of materials for treating soil surfaces to control dust and/or waterproof soil are described. Criteria to aid in the selection and use of a material, and various factors which may influence the final choice of a material are presented.		
KEYWORDS: Dust control; Field manuals; Military operations; Waterproofing		

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Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Source classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE EVALUATION OF U. S. STEEL TYPE 4.5 AIR-DEK LANDING MAT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Hugh L. Green Gordon L. Carr			
6. REPORT DATE November 1965		7a. TOTAL NO. OF PAGES 11	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-759	
b. PROJECT NO. 1-V-O-21701-A-046		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c. Task 05		AD 735 910	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Alexandria, Virginia	
13. ABSTRACT This report describes an investigation conducted to evaluate a steel landing mat, designated U. S. Steel Type 4.5 Air-Dek. The mat which was designed and fabricated by the U. S. Steel Corp., Pittsburgh, Pa., is a sandwich structure composed of an egg-crate type configuration core bonded by adhesives on top and bottom to steel facings. The sides of the panels are joined by integral tongue-and-groove connections and secured by stainless steel pins. This investigation consisted of engineering traffic tests to obtain information for use in comparing the performance of the Air-Dek with project requirements. The traffic tests were conducted on a prepared subgrade with a rolling wheel load simulating actual aircraft operations. These tests were conducted with a single-wheel load of 25,000 lb with tire inflation pressure of 250 psi on a mat-surfaced subgrade with a rated CBR of 4.4. Results of this investigation revealed that the Air-Dek mat sustained 330 coverages of traffic under the above-stated conditions, and the mat in test item 1 met the project requirements (200 coverages on a 4-CBR subgrade). Results from test item 2 indicated the probability of satisfactory Air-Dek mat being produced by several variations in fabrication; however, more extensive testing would be required to obtain valid conclusions. KEYWORDS: Steel landing mats; Traffic tests; [U. S. Steel Air-Dek landing mat]			

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Security Classification

Unclassified

Security Classification

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DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
TRAFFIC TESTS TO DETERMINE THE BENEFITS OF VEGETATION IN INCREASING TRAFFIC COVERAGES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
L. M. Womack		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1965	51	6
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper No. L-769	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 746 622	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Air Force Cambridge Research Laboratories L. G. Hancock Field Cambridge, Massachusetts
13. ABSTRACT		
<p>This report describes the accelerated traffic tests conducted with a test load and tire pressure selected to cause failure in an unsurfaced test section at a low-coverage level (less than 100 coverages) to determine the adequacy of present criteria for predicting low-coverage levels and to determine if there is added benefit in terms of increased traffic coverages from heavily sodded areas as opposed to areas which are clear of vegetation and root structure. Selection of the load and tire pressure was made from current criteria for the CBR required for operation of aircraft on unsurfaced soils and was based on the average CBR of the 0- to 6-in. depth. Results of the tests indicate that for conditions of these tests present criteria are somewhat conservative for predicting low-coverage levels of traffic. Although there was some benefit gained from the sod in one test item, there were not sufficient data to conclude that sodded areas will sustain substantially higher intensities of traffic. It is recommended that additional tests using other wheel loads and tire pressures be conducted to develop criteria for predicting low-coverage levels of traffic on unsurfaced areas.</p>		
KEYWORDS: Accelerated traffic tests; Soil strength; Trafficability; Unsurfaced airfields; Vegetative cover		

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Security Classification

DOCUMENT CONTROL DATA - R & D

(Indicate classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
INVESTIGATION OF EXPEDIENT GROUND SURFACING WITH A GLASS FIBER-RESIN MIXTURE BY A SPRAY-DEPOSITION TECHNIQUE			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Robert Turner			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1966		8	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-T-O-21701-A-046		Miscellaneous Paper No. 4-776	
c. Task 05		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 735 913	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Army Materiel Command Alexandria, Virginia	
13. ABSTRACT			
<p>Three separate areas of soil subgrade were surfaced with a reinforced-plastic laminate produced by spraying a mixture containing one-third chopped glass fibers and two-thirds resin by weight on the ground and compressing the material with rollers into dense laminates which cured to a rigid state in a few hours. In one area, 3-in.-thick, edge-grain balsa panels were placed on a layer of the laminate before it cured, and another layer of laminate was placed on the surface of the balsa, thus forming a sandwich-type structure consisting of balsa core and reinforced-plastic facings. In the second area, grooves of different configurations were formed in the soil subgrade before spraying the mixture in order to provide stiffening ribs in the reinforced-plastic laminate. In the third area, a flat sheet of reinforced-plastic laminate was formed on the surface of the subgrade. Each area was subjected to traffic of a 50,000-lb single-wheel load with a tire pressure of 200 psi. The area with the sandwich-type surfacing (CBR of 15) required frequent maintenance but sustained 350 traffic coverages. The areas with ribs and the flat sheet (CBR's of 15 and 25, respectively) were subjected to 28 traffic coverages each, with the rib section failing and the flat-sheet section being undamaged.</p>			
KEYWORDS: Expedient surfacings; Fiber reinforced plastics; Traffic tests			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE STATISTICAL ANALYSIS OF DATA FROM A COMPARATIVE LABORATORY TEST PROGRAM SPONSORED BY ACIL			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) George M. Hammitt, II			
6. REPORT DATE January 1966		7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-785	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD 736 624	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT Approximately 100 commercial laboratories performed routine tests to determine physical properties of three samples of soil under the sponsorship of the American Council of Independent Laboratories, Inc. These results were statistically analyzed at the U. S. Army Engineer Waterways Experiment Station to determine what variations might be expected in test results from commercial laboratories selected at random. Values determined by three "umpire" laboratories using carefully prescribed test procedures are included for comparison. The results show deviations from the mean to be of considerable magnitude in many instances, indicating a wider than commonly expected variation in values determined by the commercial laboratories.			
KEYWORDS: Comparison; Soil Mechanics Laboratories; Soil tests (Laboratory); Statistical analysis; [American Council of Independent Laboratories]			

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OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING AGENCY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE EVALUATION OF VARIOUS SIZES OF HARVEY ALUMINUM AM2 LANDING MAT		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) William B. Fenwick			
6. REPORT DATE January 1966		7a. TOTAL NO. OF PAGES 21	7b. NO. OF REFS
6a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-786	
b. PROJECT NO. 3-4019		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 736 727	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Naval Air Engineering Center Philadelphia, Pennsylvania	
13. ABSTRACT This investigation was conducted to determine the optimum panel size for the AM2 mat fabricated by Harvey Aluminum Company, Torrance, Calif. The basic AM2 mat was designed to sustain 1600 operational cycles of an aircraft having a gross weight of 60,000 lb with a single-wheel main-gear-assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. A test section consisting of three items with different subgrade strengths and surfaced with three different size mat panels was constructed and subjected to 188 coverages (equivalent to 1600 cycles of aircraft operations) of accelerated traffic of a 27,000-lb single-wheel load with a 30-7.7 tire inflated to 400 psi. The mat was also tested for its ability to sustain 1600 passes of a 39,000-lb single-wheel load applied in a single track to represent the calculated loading that would be imposed on the landing mat during launching of a 60,000-lb aircraft by catapult.			
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; [AM2 landing mat; Harvey aluminum landing mat]			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		12. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		13. GROUP
EVALUATION OF VARIOUS SIZES OF BUTLER AML LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1966	21	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO. 3-4019	Miscellaneous Paper No. 4-787	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 736 643	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT		
<p>This study was conducted to determine the optimum panel size of the various sizes of AML landing mat fabricated by Butler Manufacturing Company, Kansas City, Mo. The mat was to sustain 1600 operational cycles of an aircraft having a gross weight of 60,000 lb with a single-wheel main-gear-assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. A test section consisting of three items with different subgrade strengths and surfaced with the various sizes of panels was constructed and subjected to accelerated traffic of the 27,000-lb test load with tire inflated to 400 psi. Faulty fabrication of the 3- by 7-ft and particularly the 2-1/2- by 8-ft panels made it difficult to compare the service life of the panels solely on the basis of panel size. The performance of the 2- by 10-ft panels was about equal to the performance in previous tests of standard size 2- by 12-ft panels, with no fabrication defects noted in either size. The performance of the 2- by 10-ft panels was superior to that of the 2-1/2- by 8-ft or the 3- by 7-ft panels. The degree to which the poorer performance of the wider panels is attributable to poor fabrication is unknown. The use of end-connector bars with the AML mat results in improved performance of the mat when placed over a weak subgrade.</p>		
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; [AML landing mat; Butler landing mat]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
EVALUATION OF AM2 LANDING MAT REPLACEMENT PANELS AND KEYLOCK ASSEMBLIES			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
William B. Fenwick			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1966		16	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 4-0029		Miscellaneous Paper No. 4-788	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 736 728	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Naval Air Engineering Center Philadelphia, Pennsylvania	
13. ABSTRACT			
<p>This study was conducted to evaluate replacement panels and keylock assemblies as accessories for use with AM2 landing mat in the construction of forward airfields. It was also desired to evaluate the capability of the AM2 mat to withstand traffic when laid in a longitudinal direction. A test section with a 10-CBR subgrade and the AM2 mat laid in both longitudinal and transverse directions, with the accessories included, was constructed and subjected to accelerated traffic of a 27,000-lb single-wheel load with a 30.00-7.7 tire inflated to 400 psi. It is concluded that: (a) The overall performance of the replacement panels is satisfactory. (b) The keylock assemblies function satisfactorily. (c) The AM2 mat functions equally well when laid either longitudinally or transversely.</p>			
KEYWORDS: Accelerated traffic tests; Aluminum landing mats; [AM2 landing mat]			

DD FORM 1473

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		1a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE EVALUATION OF BUTLER AM2 LANDING MAT		1b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) William B. Fenwick Miller J. Mathews			
6. REPORT DATE February 1966	7a. TOTAL NO. OF PAGES 17	7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-789		
9a. PROJECT NO. 3-4019	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 736 642		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Naval Air Engineering Center Philadelphia, Pennsylvania	
13. ABSTRACT This study was conducted to compare the performance of aluminum landing mat fabricated by Butler Manufacturing Co., Kansas City, Mo., with that designed and fabricated by Harvey Aluminum, Inc., Torrance, Calif. The Harvey aluminum mat was tested and the results were reported earlier by the U. S. Army Engineer Waterways Experiment Station (WEB). The primary method of comparison was by using CBR design curves which were developed to represent 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel, main-gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. CBR design curves were also developed for 1600 passes of a 39,000-lb single-wheel load applied in a single track to represent the calculated loading imposed on the landing mat during launching of the 60,000-lb aircraft by catapult. A test section consisting of three items with different subgrade materials at different strengths and surfaced with the Butler mat was constructed and subjected to accelerated traffic of single-wheel loads ranging from 27,000 to 33,000 lb with a 30-7.7 tire inflated to 400 psi. KEYWORDS: Accelerated traffic tests; Aluminum landing mats; [AM2 landing mat; Butler landing mat]			

DD FORM 1473

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1 ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a REPORT SECURITY CLASSIFICATION Unclassified 2b GROUP
3 REPORT TITLE SUBGRADE STABILIZATION WITH PORTLAND CEMENT AND HYDRATED LIME UNDER MODIFIED T11 LANDING MAT		
4 DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5 AUTHOR(S) (Last name, first name, initial) Brabston, William N. Pimental, Richard A.		
6 REPORT DATE March 1966	7a TOTAL NO OF PAGES 43	7b NO OF REFS 1
8a CONTRACT OR GRANT NO. b. PROJECT NO. 1-V-0-21701-A-046 c. Task 05 d.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 3-798 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 630 561	
10 AVAILABILITY/LIMITATION NOTICES Approved for public release; distribution unlimited.		
11 SUPPLEMENTARY NOTES	12 SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.	
13 ABSTRACT Sections of a low-strength subgrade were treated with portland cement and hydrated lime to test the ability of these materials to strengthen the subgrade during inclement weather in connection with a field operational test of modified T11 aluminum landing mat. Data obtained in the field during construction and during subsequent aircraft traffic testing were supplemented by additional field measurements and laboratory tests on chunk samples obtained several months after completion of the basic landing mat evaluation program. It was determined that both portland cement and hydrated lime, applied as 3 percent admixtures, were effective in improving the resistance of the sensitive subgrade to loss in bearing capacity during wet-weather operations. A section also was constructed using polyethylene sheeting over untreated subgrade as a protective membrane under the landing mat, but the sheeting was of doubtful value because of its inability to withstand mat embedment without damage. KEYWORDS: Aluminum landing mats; Cement soil stabilization; Lime soil stabilization; [T11 landing mat]		

DD FORM 1 JAN 64 1473

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. SOURCE OF INFORMATION (Corporate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		20. REPORT SECURITY CLASSIFICATION Unclassified
2. REPORT TITLE		
REPORT OF CONFERENCES ON DUST CONTROL, JANUARY 1966		
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
4. AUTHOR(S) (First name, middle initial, last name)		
William L. McInnis		
5. REPORT DATE	70. TOTAL NO. OF PAGES	70. NO. OF REFS
April 1966	6	
6. CONTRACT OR GRANT NO.	80. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-811	
7. PROJECT NO.	90. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 736 626 L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; 31 December 1971. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>As a result of an urgent request by the Office, Chief of Engineers, in a meeting in Washington, D. C., on 14 January 1966, two conferences on dust control were subsequently held during the latter part of January. The first conference was held with industry representatives and the second conference was held with Consultants selected after the 14 January 1966 meeting. Minutes of the two conferences are summarized in the paper.</p>		
KEYWORDS: Dust control; Meetings		

DD FORM 177

REPLACES DD FORM 177, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CONDITION SURVEY, VANCE AIR FORCE BASE, ENID, OKLAHOMA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (Last name, first name, initial) Vedros, Philip J.		
6. REPORT DATE May 1966	7a. TOTAL NO. OF PAGES 26	7b. NO. OF REFS 5 (in text)
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-815	
8. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 483 707	
10. AVAILABILITY/LIMITATION NOTICES Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT <p>This report presents the results of field tests performed on taxiway XV-A, Vance Air Force Base, Enid, Oklahoma, which was showing signs of distress from aircraft traffic. The field work at Vance AFB was accomplished by a Waterways Experiment Station survey team on 27 and 28 March 1965. Background data, such as construction history, climate, physical properties of pavements, and materials, have been extracted from previous evaluation reports of this field and are included herein. It is concluded that the pavement rutting and movement occurring on the surface are due to a high asphalt content in the surface course mix. Also, the use of the present high-pressure tire is increasing the density of the asphaltic-concrete surface course in areas of high asphalt content to a point where the voids content is below the minimum required value of 3.0 percent and flushing is occurring.</p> <p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Vance Air Force Base, Enid, Okla.]</p>		

DD FORM 1473
JAN 64

Unclassified
Security Classification

Summary of Application

(2) Supply classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.

DD FORM 1473
1 MAY 54
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OBSOLETE FOR ARMY USE.

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
DEVELOPMENT OF CBR DESIGN CURVES FOR RUNWAYS TO BE SURFACED WITH M8A1 (FORMERLY T10) STEEL LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (Last name, first name, initial)		
Burns, C. D. Fenwick, W. B.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1966	41	0
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 1-V-O-21701-A-046		Miscellaneous Paper No. 4-817
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD 484 220
10. AVAILABILITY/LIMITATION NOTICES		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>Accelerated traffic tests, which simulated aircraft taxiing operations, were conducted on test sections constructed on subgrades of various strengths and surfaced with M8A1 (formerly T10) steel landing mat. The purpose of the tests was to obtain data on the service life of the M8A1 mat under various conditions of wheel load, tire pressure, and subgrade strength. From these data, CBR design curves for runways surfaced with M8A1 mat, similar to CBR design curves for bituminous pavements, have been developed. Operations of military aircraft with single-wheel loads ranging from 25,000 to 50,000 lb and tire pressures ranging from 60 to 300 psi and aircraft with twin-wheel assembly loads of 50,000 lb were simulated by means of a test load cart. CBR, water content, and density of the subgrade were measured before and during the traffic tests, and the condition of the test sections was recorded. Traffic was applied until the test sections failed or until it was evident that 700 coverages could be completed by the test load cart. The design curves, which were developed by correlating the M8A1 test data with flexible pavement design relations, are considered adequate for use in designing landing strips to be surfaced with M8A1 steel landing mat.</p>		
KEYWORDS: Accelerated traffic tests; California Bearing Ratio; Runways; Steel landing mats; Subgrades; [M8A1 (T10) landing mat]		

DD FORM 1473
JAN 64

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE DUST ALLEVIATORS: Report 1, RESIN- AND LATEX-BASE CONCRETE CURING COMPOUNDS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Report 1 of a series		
5. AUTHOR(S) (Last name, first name, initial) Decell, Joseph L.		
6. REPORT DATE June 1966	7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-819, Report 1	
b. PROJECT NO. 1-V-O-21701-A-047		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 486 704	
10. AVAILABILITY/LIMITATION NOTICES Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT Tests were conducted at the U. S. Army Engineer Waterways Experiment Station to evaluate two compounds for use as dust alleviators. The compounds, a resin-base concrete curing compound and a latex-base concrete curing compound, were applied to two different types of materials. One material was Vicksburg loess and the other was Reid Bedford sand. The curing compounds were applied to the two materials, allowed to cure, and tested using a six-blade fan which produced velocities across the material surface averaging approximately 4000 ft per min. As a result of these tests, the following conclusions were made: (a) neither compound could be used in traffic areas; (b) the compounds could be used in such nontraffic areas as the fringe areas of a helicopter landing pad, runway, or rocket launch pad; (c) the resin-base compound performed satisfactorily on sand, but was not satisfactory when applied to the loess; (d) the latex-base compound performed satisfactorily on the loess, but was not satisfactory when tested on sand; (e) when wetted to simulate exposure to rain, the resin-base compound applied to the sand failed under testing. It is recommended that further tests be conducted to evaluate other compounds for use as dust alleviators. These tests should be performed using larger test areas and higher disc loads, with variations in application techniques. These compounds should also be tested under the downwash of a jet engine in order to evaluate their performance under conditions of jet VTOL and STOL aircraft traffic. KEYWORDS: Curing agents; Dust control; Materials; Resin concrete		

DD FORM 1473
JAN 64Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE FIELD TESTS OF AM3 LANDING MAT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Hugh L. Green			
6. REPORT DATE May 1966		7a. TOTAL NO. OF PAGES 16	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-820	
b. PROJECT NO. 3-4070			
c. ARPA No. 285		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 737 272	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Advanced Research Projects Agency and U. S. Naval Air Engineering Laboratory Philadelphia, Pennsylvania	
13. ABSTRACT Field tests were conducted on AM3 landing mat to determine the capability of the mat to support helicopter operations when floated on water and when placed on marshy soil having a CBR of about 0.25 percent. The mat was an aluminum, cellular-type structure filled with polyurethane foam, with top and bottom facings fabricated from aluminum alloy sheets. The side and end connectors were of an extruded aluminum alloy. The individual panels were assembled on a pond into an approximately 62- by 90-ft floating landing pad. The pad was subjected to repeated landings and taxiing operations of a UH-34D helicopter with loads ranging to 13,000 lb and landing forces ranging to 2.41 g. The pad was then disassembled, moved to a marsh area, and reassembled. The pad was again subjected to operations of a helicopter with a gross weight of 12,000 lb and landing forces of 2.18 g.			
KEYWORDS: Aluminum landing mats; Floating landing mats; Helicopter landing pads; Polyurethane resins; Traffic tests; [AM3 landing mat]			

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Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
COLLECTION OF DOCUMENTS PERTINENT TO DEVELOPMENT OF MILITARY SOIL STABILIZATION OBJECTIVES AND REQUIREMENTS (1956-1959)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
George R. Kozan John D. Stouffer		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1966	1 + 7 appendixes	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-V-0-21701-A-046	Miscellaneous Paper No. 4-824	
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 737 393	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. A. Army Materiel Command Alexandria, Virginia
13. ABSTRACT		
<p>This report consists of a collection of documents (Appendixes A-F) prepared during the period 1956 through 1959 which summarize the development of objectives and requirements pertinent to the military soil stabilization research activities. The collection includes memoranda, correspondence, and minutes of conferences which were concerned with the delineation of the broad project objectives in specific terms and measurable parameters to provide realistic guides for the development, evaluation, and design phases of the stabilization research program. Of particular importance was the organization of the stabilization objectives into four basic classifications or categories, based on various military road and airfield operational requirements and functions, to be accomplished by soil treatment. Significantly, the basic classifications are sufficiently flexible and encompassing to permit the inclusion of new requirements or revisions in existing requirements to conform with changes in military operational concepts. thus maintaining a logical continuity in the long-range approach to the soil stabilization problems.</p>		
KEYWORDS: Military operations; Soil stabilization; State of the art studies		

DD FORM 1473

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DOCUMENT CONTROL DATA - R & D		
<small>1. SOURCE OF EVALUATION OF TITLE, BODY OF ABSTRACT AND INDEXING INFORMATION MUST BE ENTERED WHEN THE REPORT IS CLASSIFIED.</small>		
<small>2. ORIGINATOR'S ACTIVITY (sponsor's authority)</small> U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		<small>12. REPORT SECURITY CLASSIFICATION</small> Unclassified
<small>3. REPORT TITLE</small> A SURVEY OF THE USE OF NUCLEAR INSTRUMENTS FOR IN SITU SOILS MEASUREMENTS WITHIN THE CORPS OF ENGINEERS		
<small>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</small>		
<small>5. AUTHOR(S) (First name, middle initial, last name)</small> Loren M. Womack		
<small>6. REPORT DATE</small> July 1966	<small>7a. TOTAL NO. OF PAGES</small> 10	<small>7b. NO. OF REFS</small>
<small>8a. CONTRACT OR GRANT NO.</small>	<small>8b. ORIGINATOR'S REPORT NUMBER(S)</small> Miscellaneous Paper No. 4-827	
<small>b. PROJECT NO.</small>	<small>9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</small> AD 891 959L	
<small>10. DISTRIBUTION STATEMENT</small> Distribution limited to U. S. Government agencies only; test and evaluation; 31 December 1971. Other requests for this document must be referred to Office, Chief of Engineers.		
<small>11. SUPPLEMENTARY NOTES</small>		<small>12. SPONSORING MILITARY ACTIVITY</small> Office, Chief of Engineers, U. S. Army Washington, D. C.
<small>13. ABSTRACT</small> <p>This report presents the results of a questionnaire that was circulated within the Corps of Engineers in August 1965 to obtain information on the use of nuclear instruments for determining soil moisture and density on projects under the jurisdiction of the CE.</p>		
KEYWORDS: Nuclear equipment; Nuclear methods		

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE

Unclassified
 Security Classification

<p>Unclassified</p> <p>DOCUMENT CONTROL DATA - R & D</p> <p>Results of classification in title, body of abstract and inclusive annotation must be entered, then the overall report is classified.</p>		
<p>1. ORIGINATING AGENCY (Signature author)</p> <p>U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi</p>		<p>20. REPORT SECURITY CLASSIFICATION</p> <p>Unclassified</p>
<p>3. REPORT TITLE</p> <p>INVESTIGATION OF THIOKOL PAVEMENT COATING</p>		
<p>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</p>		
<p>5. AUTHOR(S) (First name, middle initial, last name)</p> <p>Vincent Cassino</p>		
<p>6. REPORT DATE</p> <p>August 1966</p>	<p>76. TOTAL NO. OF PAGES</p> <p>6</p>	<p>75. NO. OF REFS</p>
<p>21. CONTRACT OR GRANT NO.</p>	<p>98. ORIGINATOR'S REPORT NUMBER(S)</p> <p>Miscellaneous Paper No. 4-839</p>	
<p>22. PROJECT NO.</p>	<p>99. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</p> <p>AD 891 955L</p>	
<p>10. DISTRIBUTION STATEMENT</p> <p>Distribution limited to U. S. Government agencies only; test and evaluation; November 1971. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station.</p>		
<p>11. SUPPLEMENTARY NOTES</p>	<p>12. SPONSORING MILITARY ACTIVITY</p> <p>U. S. Air Force</p>	
<p>13. ABSTRACT</p> <p>This investigation was conducted to evaluate the use of Thiokol polysulfide epoxy coatings as seal coats in maintaining asphaltic concrete pavements and protecting them from the effects of jet engine blasts and fuel spillage. The materials were evaluated to determine their ease of application and quality of performance under conditions similar to those to which they would be subjected when used in the maintenance of flexible airfield pavements.</p>		
<p>KEYWORDS: Epoxy coatings; Jet blast resistant materials; Jet fuel resistant materials; Seal coats; [Thiokol coatings]</p>		

DD FORM 102-175
1 NOV 65

REPLACES DD FORM 102, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE XV5A AIRCRAFT FLIGHT TEST/LANDING STRIP EVALUATIONS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) William B. Fenwick			
6. REPORT DATE September 1966		7a. TOTAL NO. OF PAGES 5	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-844	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 737 274	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Aviation Materiel Laboratories Ft. Eustis, Va.	
13. ABSTRACT This report presents the results of a field investigation of sites for aircraft flight tests. The investigation was concerned with the capability of the aircraft to operate on or hover over unprepared or expediently surfaced landing strips. The report describes the test aircraft, purpose and scope of the investigation, and the test sites selected, which were located at or near Edwards AFB, California. It also discusses the XV5A aircraft operations conducted at several of the sites while the U. S. Army Engineer Waterways Experiment Station (WES) field party was still at Edwards AFB for this study.			
KEYWORDS: Aircraft; Landing strips; Unsurfaced runway performance and evaluation; [Edwards AFB, California; XV5A Aircraft]			

DD FORM 1473 1 NOV 65

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R&D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
HEAT-STRENGTH TESTS ON MEMBRANES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (Last name, first name, initial)		
Decell, Joseph L.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1966	54	none
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-V-0-21701-A-047	Miscellaneous Paper No. 4-847	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 802 402	
10. AVAILABILITY/LIMITATION NOTICES		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>Tests were conducted on five types of membranes to determine their resistance to heat exposure and their ability to retain their original strength after such exposure. Results indicated that for all membranes tested, both vinyl-coated and neoprene-coated, the majority of samples tested withstood temperatures of 500 F with only small losses in strength. Overall, the neoprene-coated membranes withstood higher temperatures than the vinyl-coated membranes.</p>		
KEYWORDS: Membranes, Temperature		

DD FORM 1473
1 JAN 64

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
EVALUATION OF GUIDE RAIL IN CONJUNCTION WITH KAISER AND HARVEY LANDING MAT (AM2)			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Cecil D. Burns Walter R. Barker			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1966		25	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 6-4006		Miscellaneous Paper No. 4-850	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 737 275	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Naval Air Engineering Center Philadelphia, Pennsylvania	
13. ABSTRACT			
<p>This investigation was conducted to evaluate the performance, under simulated aircraft loadings, of (a) a guide rail (for use in assisted take-offs) designed for use with Airfield Matting No. 2 (AM2), (b) Kaiser Aluminum Company's AM2 when used in conjunction with guide rail and when used without guide rail, and (c) modified AM2 from Harvey Aluminum, Inc., when used in conjunction with guide rail. It was specifically desired to determine the effect that subgrade strength and soil type would have on the performance of the guide rail and AM2.</p>			
<p>KEYWORDS: Aircraft loads; Aluminum landing mats; [AM2 landing mat; Harvey Aluminum landing mat; Kaiser Aluminum landing mat]</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
2b. GROUP			
3. REPORT TITLE EVALUATION OF HARVEY TWO-PIECE LANDING MAT (AM2)			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Walter R. Braker			
6. REPORT DATE November 1966		7a. TOTAL NO. OF PAGES 18	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-852	
9a. PROJECT NO. 6-4031		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD 738 348	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Naval Air Engineering Center Philadelphia, Pennsylvania	
13. ABSTRACT This investigation was conducted to evaluate a so-called two-piece landing mat (AM2) extruded and fabricated by Harvey Aluminum Co., Inc., Torrance, Calif. The mat was fabricated from two 1-ft-wide extrusions welded together to form a 2-ft-wide plank. A test section consisting of three clay subgrade items (with strengths of 3, 6 and 10 CBR) and one loosely compacted sand item was constructed and surfaced with the two-piece mat. The test section was subjected to uniform and single-line traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi.			
KEYWORDS: Aluminum landing mats; Traffic tests; [AM2 landing mat; Harvey Aluminum landing mat]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
SERVICE TESTS OF T17 MEMBRANE AND WX18 MEMBRANE SURFACING, FORT CAMPBELL, KY., 9-12 MAY, 2-3 JUNE, AND 15-30 JUNE 1966, AND INSPECTIONS OF THE SURFACING 10-23 JULY AND 8-12, AUGUST 1966			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Richard H. Grau			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
October 1966	18		
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO. 1-V-0-21701-A-046	Miscellaneous Paper No. 4-855		
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.	AD 738 349		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Army Materiel Command Alexandria, Virginia	
13. ABSTRACT			
<p>During the period of July through August 1965, a type III assault airfield was constructed at Landing Zone 4, Fort Campbell, Ky., and was surfaced with T17 membrane by members of the 27th Engineer Battalion (C). The airfield consisted of a 72-ft-wide and 3000-ft-long runway with a parallel taxiway 50 ft wide and 3000 ft long, two connecting taxiways 72 ft wide and 244 ft long, and a parking apron 145 ft wide and 195 ft long. Service tests of the T17 membrane were conducted to determine whether the membrane would withstand C-130 aircraft operations. The tests revealed that the T17 membrane would withstand C-130 aircraft traffic in all areas except for the ends of the runway where the aircraft touched down during landings and conducted maximum engine runups prior to takeoff. T17 membrane was removed from areas approximately 300 ft long and 72 ft wide at each end of the runway so WX18 membrane could be installed in its place. Although service tests had been conducted previously on the T17 membrane (21 July 1965 - 1 April 1966), the T17 membrane which was left in place on the runway was evaluated further in combination with the WX18 membrane as traffic and soil data were recorded to determine the performance of both membranes. Service tests were conducted to determine the suitability of WX18 membrane as (a) a dustproofing and waterproofing media when placed on soil subgrades and (b) a membrane surfacing capable of withstanding locked-wheel braking action of C-130 aircraft.</p> <p>KEYWORDS: Membranes (Airfields); Traffic tests; [Fort Campbell, Ky.; T17 membrane; WX18 membrane]</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE TRAFFIC TESTS ON "MO-MAT"		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Hugh L. Green			
6. REPORT DATE December 1966		7a. TOTAL NO. OF PAGES 2	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-872	
8c. PROJECT NO.		8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 737 766	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Alexandria, Virginia	
13. ABSTRACT Accelerated traffic tests were conducted at the Waterways Experiment Station in October 1966 on panels of MO-MAT manufactured by Air Logistics Corporation, Pasadena, California. MO-MAT is a new and highly advanced fiberglass reinforced plastic material made of Stratoglas. The MO-MAT consists of 11- by 50-ft continuous panels of Stratoglas molded into a unique waffle-like configuration. The material is approximately 5/8 in. thick in total thickness and has a uniform material thickness of 0.100 in. and weighs about 1 lb per sq ft. This preliminary investigation was conducted on four special panels 64 in. square connected by rivets placed in predrilled holes.			
KEYWORDS: Accelerated traffic tests; Fiber reinforced plastics; Plastic landing mats; [Mo-Mat landing mat]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

UNCLASSIFIED		
DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING ACTIVITY (disposition authority)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION, IWO JIMA AIR FORCE BASE, VOLCANO ISLANDS, AND APPENDIX A: STUDIES MADE FOR EVALUATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros John H. Shamburger		
6. REPORT DATE March 1967	7. TOTAL NO. OF PAGES 3	7. NO. OF REFS
8. CONTRACT OR GRANT NO.	9. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-880	
5. PROJECT NO.	10. OTHER REPORT NO(S) (any other numbers that may be assigned this report) AD 908 3261 AD 909 2431	
11. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; April 1973. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station.		
12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Far East Rear Japan		
13. ABSTRACT A visual inspection of the pavements in July 1966 indicated their condition to range from fair to poor. The main taxiway, which had received a sand seal, appeared on the surface to be in better condition than the rest of the field. Cracking was not as severe on this facility. The pavement on the runway was badly cracked and quite rough. Numerous bird-baths existed where water ponded after a rain. Loss of grade was evident in the center of the runway, apparently from the effects of aircraft overload, but the rough condition existed over the entire 200-ft width. The patches that were placed in 1959 had open cracks along nearly all edges and in most cases appeared to be slightly lower than the surrounding pavement. This contributed to the roughness of the surface. Grass was evident in the cracks outside the center third of the runway. The pavement surface on the parking apron, which had received a tar seal, was badly cracked but the surface was not spalling and causing loose debris as on the runway and other areas of the apron. The pavement on the remaining portion of the apron area was in poor condition. The dense underbrush which had been allowed to grow adjacent to taxiways 1 and 2 was being cleared at the time of this survey and the pavement on these taxiways was in about the same condition as the runway pavement.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Iwo Jima Air Force Base, Volcano Islands]		

DD FORM 177, 1 NOV 65. PREVIOUS EDITIONS ARE OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing notation must be entered when the overall report is classified)		
1. ORIGINATING AGENCY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
KAISER LANDING MAT FAILURE STUDY (MX-19)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Lyman W. Heller		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1967	21	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-881	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 738 351	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT		
<p>Kaiser landing mats (MX-19) are fabricated by bonding thin aluminum plates (skins) to each side of an aluminum honeycomb core to form a composite sandwich. Extruded aluminum connectors are welded to the skin along the periphery of the sandwich and the resulting circumferential internal void is filled with a polymer potting compound. When simulated aircraft wheel traffic was applied to joined sections of this matting at the Waterways Experiment Station (WES), the connector-skin welds parallel to the direction of wheel travel eventually split open and the sandwich was progressively severed from the connector. The fracture soon presented a tire hazard or excessive mat deflection occurred; the mat was then considered to have reached a failure condition. After review of the fabrication of the mat, the material properties of the aluminum and polymer, and the laboratory tests, the results of the traffic tests on three sections of Kaiser mat are summarized.</p>		
<p>KEYWORDS: Aluminum landing mats; Composite materials (Landing mat construction); Landing mat failures; [Kaiser aluminum landing mat; MX-19 landing mat]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
FORKLIFT OPERATIONS ON T17 MEMBRANE SURFACING ON SAND SUBGRADE IN OPEN-STORAGE AREAS; ENGINEER TESTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (Last name, first name, initial)		
Tucker, Sidney G. Vollor, Timothy W.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1967	30	0
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-V-0-21701-A-046	Miscellaneous Paper No. 4-882	
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 812 811	
10. AVAILABILITY/LIMITATION NOTICES		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Alexandria, Virginia
13. ABSTRACT		
<p>This investigation was conducted to determine the feasibility of using T17 membrane as a surfacing material for operations of forklifts in depot open-storage areas at Cam Ranh Bay, South Vietnam. A test area 20 ft wide and 50 ft long was excavated to a depth of 24 in. and backfilled with poorly graded sand. The membrane was placed over the section and secured. A Hyster Model RT-150 forklift was used as the test vehicle. Tests were performed on a loose, dry sand subgrade and on a slightly compacted sand subgrade. During tests, the CBR for the dry sand subgrade ranged from 1 to 3 and for the wet sand subgrade from 2 to 8. Tests performed during this investigation indicated that a Hyster Model RT-150 forklift loaded to full pay load (15,000 lb) cannot be operated on the T17 membrane surfacing placed over a loose sand subgrade; when loaded to one-half pay load, the forklift can operate satisfactorily if no attempts are made to turn or steer the vehicle; when empty, the forklift's drive wheels will slip excessively and cause severe abrasion of the surfacing and wear of the drive wheel tires; subgrades that rut as much as 7 in. will cause the lifting frame of the forklift to drag, thus tearing the surface. It was determined that the T17 membrane should not be used as a surfacing material for operations of forklifts over loose sand subgrades. Instead, lightweight surfacing with load-spreading capabilities should be used.</p> <p>KEYWORDS: Forklift trucks; Membranes; Open storage areas; Sands; Subgrades; Traffic tests; [Cam Ranh Bay, S. Vietnam; T17 membranes]</p>		

DD FORM 1473
1 JAN 64

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R&D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE TESTS OF LIGHTWEIGHT WATERPROOFING MEMBRANES FOR USE BENEATH AML LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (Last name, first name, initial) Tucker, Sidney G. Grau, Richard H.		
6. REPORT DATE April 1967	7a. TOTAL NO. OF PAGES 43	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO. b. PROJECT NO. 1-V-0-21701-A-046 c. Task 05 d.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-884 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 813 986
10. AVAILABILITY/LIMITATION NOTICES Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT <p>This study was conducted to determine the ability of 12 lightweight membranes to waterproof the subgrade beneath solid planks of AML landing mat. A test section 24 ft wide and 110 ft long was constructed under the protection of a hangar to provide the conditions required for accurately controlled comparative traffic tests. One half of the test section consisted of a heavy clay (CH) subgrade, and the other half consisted of a fine, silty sand (SM) subgrade.</p> <p>In the field, 200 coverages were applied to the test lane with a single-wheel load of 25,000 lb (at a 250-psi inflation pressure). In the laboratory, the weight, breaking and tearing strengths, elongation, and resistance of the membrane to flame, heat, fuel spillage, and weathering were determined.</p> <p>The traffic tests indicated that membrane materials such as the T16, Herculite 3-ply, Griffolyn No. 105, Celtex 40 mil, and polyethylene 30 mil waterproofed both sand (SM) and clay (CH) subgrades beneath the AML landing mat for 200 coverages. Further evaluation of the membranes indicated that the T16 membrane and Herculite 3-ply are the most desirable materials for use beneath the AML landing mat.</p> <p>KEYWORDS: Aluminum landing mats; Membranes (Airfields); Subgrades; Traffic tests; Waterproofing; [AML landing mat; Herculite 3-ply membrane; T16 membrane]</p>		

DD FORM 1473

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE EVALUATION OF THREE-PIECE AM2 ALUMINUM LANDING MAT		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) William N. Brabston		
6. REPORT DATE April 1967	7a. TOTAL NO. OF PAGES 64	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Report No. 4-886	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.	AD 737 767	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT This investigation was conducted to evaluate three-piece AM2 landing mat extruded by the Michael Flynn Manufacturing Company, Philadelphia, Pa., and fabricated by the Washington Aluminum Company, Enterprise, Ala. The mat was fabricated from three 8-in.-wide extrusions welded together to form a 2-ft-wide plank. A test section consisting of one sand item and three clay subgrade items with various CBR strength values was constructed and surfaced with the three-piece mat. The test section was subjected to uniform-coverage and single-line traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main gear assembly load of 27,000 lb with a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that: (a) When placed on a subgrade having a CBR of 6.8 or greater throughout the period of traffic, the three-piece mat will sustain 1600 cycles (188 coverages) of an aircraft having a 27,000-lb single-wheel load and a 400-psi tire-inflation pressure. (b) The three-piece mat will sustain 1600 passes (in a single path located 2 ft or more from the mat end joints) of a 27,000-lb single-wheel load with a tire-inflation pressure of 400 psi when placed on a subgrade having a CBR of 5.7 or greater throughout the period of traffic. (c) General behavior of the mat in these tests was not materially affected by the three-piece nature of the mat planks. KEYWORDS: Aluminum landing mats; Subgrades; Traffic tests; [AM2 landing mats]		

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Unclassified
Security Classification

DOCUMENT CONTROL DATA - R 3		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		
28. REPORT SECURITY CLASSIFICATION		Unclassified
29. GROUP		
3. REPORT TITLE PAVEMENT CONDITION SURVEY REPORT, PEASE AIR FORCE BASE, PORTSMOUTH, NEW HAMPSHIRE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros		
6. REPORT DATE April 1967	76. TOTAL NO. OF PAGES 5	77. NO. OF REFS
8. CONTRACT OR GRANT NO.	25. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-891	
9. PROJECT NO.	95. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 908 327L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; November 1971. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army and Headquarters, U. S. Air Force Washington, D. C.
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Pease Air Force Base (AFB) in July 1965. A layout of the airfield pavements is shown in plate 1. The survey was concerned mainly with (a) the performance and condition of the flexible pavements relative to their usage and predicted life or design requirements, and (b) the maintenance methods being used at the base and their effectiveness. No physical tests of pavement, foundation, or patching materials were performed during this survey; the investigation was limited to visual observations. This report includes a discussion and pertinent conclusions regarding the performance of the flexible pavements based on these observations.		
KEYWORDS: Flexible pavement maintenance; Flexible pavement performance and evaluation (Airfields); [Pease Air Force Base, Portsmouth, New Hampshire]		

REPLACES DD FORM 1475, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE EVALUATION OF KAISER ALUMINUM HONEYCOMB LANDING MAT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Robert Turner Gordon L. Carr			
6. REPORT DATE August 1967		7a. TOTAL NO. OF PAGES 44	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-897	
b. PROJECT NO. 1-V-0-21701-A-046		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 820 223	
c. Task 05			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT The investigation reported herein was conducted to evaluate an aluminum honeycomb-core landing mat. The mat, which was designed and fabricated by the Kaiser Aluminum and Chemical Sales Company, Inc., Oakland, Calif., is a sandwich-type structure composed of an aluminum honeycomb core bonded by adhesives on top and bottom to aluminum facings. The extruded edge connectors are welded to the facings and bonded to the core. The panels are joined at two edges with a hinging-type connection. The other two edges are joined by an overlap-underlap type connection and locked together by insertion of a connector bar. This investigation consisted of engineering traffic tests to obtain information for use in comparing the performance of the Kaiser mat with project requirements. The traffic tests were conducted on a prepared subgrade with a rolling wheel load simulating actual aircraft operations. These tests were conducted with a single-wheel load of 25,000 lb with a tire-inflation pressure of 250 psi on a mat-surfaced subgrade with a rated CBR of 3.6. Results of this investigation revealed that the Kaiser mat sustained 378 coverages of traffic under the above-stated conditions equivalent to 550 coverages on a 4-CBR subgrade, thus exceeding the project requirements (200 coverages on a 4-CBR subgrade) by 175 percent. Failures were developed by overstressing the potting compound between the edge connectors and the honeycomb core. Further study and testing are needed to develop a replaceable panel in order that repairs can be made when panels in the interior of a section are damaged. KEYWORDS: Aluminum landing mats; Honeycomb structures; Traffic tests; [Kaiser aluminum honeycomb landing mats]			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		24. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		25. GROUP
CONDITION SURVEY, LORING AIR FORCE BASE, LIMESTONE, MAINE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1967	6	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper No. 4-898	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 737 769	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army and U. S. Air Force Washington, D. C.
13. ABSTRACT		
<p>This report presents the results of a condition survey performed at Loring AFB in July 1965. A layout of the airfield pavements is shown in fig. 1. The major areas of interest in this condition survey were as follows: (a) The performance and conditions of the flexible pavements relative to usage and predicted life or design requirements. (b) The maintenance methods used and the effectiveness of the maintenance work. The field work for this investigation was limited to visual observations made during the condition survey. No physical tests of the foundations or patching materials were performed. Samples of the asphaltic pavement that was being replaced on taxiway A and taxiway A extension were obtained, and laboratory tests were performed to determine what changes had occurred in the asphalt properties over the period of years the pavement had been in use.</p>		
KEYWORDS: Flexible pavement maintenance; Flexible pavement performance and evaluation (Airfields); [Loring Air Force Base, Limestone, Maine]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified Security Classification		
DOCUMENT CONTROL DATA - R & D <small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE V/STOL AIRCRAFT CHARACTERISTICS AFFECTING BEHAVIOR OF SUPPORTING SURFACES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Thomas D. White		
6. REPORT DATE July 1967	7a. TOTAL NO. OF PAGES 32	7b. NO. OF REFS 43
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-908	
8b. PROJECT NO.		
8c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
8d.	AD 892 485L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; December 1971. Other requests for this document must be referred to U. S. Army Engineer Waterways Experiment Station.		
11. SUPPLEMENTARY NOTES		112. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
12. ABSTRACT The various parameters that will define downwash flow from present and future, high-performance V/STOL aircraft will be substantially more severe than those that define the downwash of the helicopter, which represents VTOL aircraft currently in use. In addition, the intense heat from some lift systems will be an added problem. It is desirable that the parameters of downwash flow, including any heat generated, be known in order that provision for their effects can be incorporated in airfield design criteria. This study included a review of available literature and visits to installations that are concerned with operational-type V/STOL aircraft in an effort to assemble operational downwash data. Limited data are presented. A discussion of pertinent present and future experimental V/STOL aircraft, engines, and configurations is presented herein. This discussion can be used to interpret the feasibility of an operational aircraft. The limited data found to be available are presented and discussed using experience with helicopters as a basis for comparison. The attempt to gather operational downwash data revealed a lack of such data and that there are no plans for obtaining such information. In anticipation of need for criteria for V/STOL airfield design, it is suggested that one of two programs be implemented: (a) Introduce a requirement for obtaining downwash characteristics information in the flight and control testing programs of current and future V/STOL aircraft, and (b) Determine the downwash characteristics experimentally by simulating each of the various V/STOL lift mechanisms. The first program appears to be the more desirable and economical.		
KEYWORDS: Blast effects; Landing fields; Short take-off and landing aircraft; Vertical take-off and landing aircraft		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE FLOTATION REQUIREMENTS FOR AIRCRAFT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Richard G. Anlvin Donald N. Brown		
6. REPORT DATE August 1967	7a. TOTAL NO. OF PAGES 40	7b. NO. OF REFS 42
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-923	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 739 551	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT This paper presents limited background on ground-flotation criteria development and some of the concepts on which current criteria are based. It gives an insight into various problem areas in development of the criteria and explains the extent or limits of applicability of flotation criteria presently in use. In the final portion of the paper, emphasis is given to the particular aircraft characteristics that contribute good or high flotation and some discussion is presented of factors, not treated by current criteria, which recent research indicates may have a significant effect on flotation. KEYWORDS: Aircraft; Ground flotation		

DD FORM 1473

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, BICYCLE ARMY AIRFIELD, FT. IRWIN, CALIFORNIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
September 1967	5		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)		
E. PROJECT NO.	Miscellaneous Paper No. 4-924		
c.	9b. OTHER REPORT (OIS) (Any other numbers that may be assigned this report)		
d.	AD 738 374		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT			
<p>The purpose of this report is to present the results of an inspection performed at Bicycle Army Airfield (AAF) in March 1967. The inspection was limited to visual observations, and no tests were conducted on the existing unsurfaced runways or taxiways. A layout of the airfield with proposed future airfield construction is shown in plate 1. Pertinent data are included from a geologic and soil survey made in October 1966 for another project.</p>			
KEYWORDS: Unsurfaced runway performance and evaluation; [Bicycle Army Airfield, Ft. Irwin, Calif.]			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate Author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
XC-142A AIRCRAFT FLIGHT TESTS; LANDING STRIP EVALUATIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(s) (First name, middle initial, last name)		
William B. Ferwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1967	49	1
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-931	
9. PROJECT NO.		
c.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 738 376	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Air Force Systems Command Aeronautical Systems Division Wright-Patterson AFB, Ohio
13. ABSTRACT		
<p>Tests were conducted at four sites in California to determine the capability of the XC-142A aircraft to operate on or hover over unprepared or expediently surfaced landing strips. Soil data were collected from eight sites, but only four of the sites were used for subsequent flight tests. Results of the tests indicated that the overall performance of the XC-142A was good. Rutting was moderate at every test site except one. However, results also indicated that the flotation characteristics of the nose gear should be increased, and means should be provided to prevent future derailing as occurred at one of the test sites. Additional study of the relation of wing angle versus soil recirculation is also needed. After the flight tests had been completed, a mineralogical analysis of soil samples from the four sites was made. Results of the analysis are presented in Appendix A.</p>		
KEYWORDS: Aircraft; Ground flotation; Landing strips; Unsurfaced runway performance and evaluation; [XC-142A aircraft]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified Security Classification		
DOCUMENT CONTROL DATA - R & D <small>(Security classification of title, body of abstract and indexes annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE EVALUATION OF M8A1 LANDING MAT WITH VARIOUS FIX ATTACHMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Hugh L. Green		
6. REPORT DATE September 1967	7a. TOTAL NO. OF PAGES 39	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO. b. PROJECT NO. c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. 4-935 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 824 212	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT <p>An airfield runway constructed with M8A1 mat caused damage to tires of aircraft because of sharp edges along the male overlap edges of the mat panels. Among solutions proposed to prevent this damage was use of metal strips (fixes) attached to the female edges of the panels. This report describes traffic tests conducted on M8A1 mat, laid on a prepared subgrade, with five types of fixes attached to the rolled edges of the panels. Specially designed load carts simulating C-130 aircraft loading were used to determine if the fixes would alleviate the excessive tire wear, and if they would withstand rolling wheel loads and skidding of the C-130. Results indicated that although the fixes withstood the effects of both traffic and skidding tests, they did not appreciably reduce the tire damage caused by the overlap edges. Therefore, other means of reducing or eliminating the tire damage are recommended.</p> <p>KEYWORDS: Aircraft tires; Steel landing mats; Tire performance; Traffic tests; [M8A1 landing mats]</p>		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF REPUBLIC STEEL GROUND MAT FOR USE IN DEPOT OPEN-STORAGE AREAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Hugh L. Green Gordon L. Carr		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1967	69	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-945	
b. PROJECT NO. 1-V-0-21701-A-046, Task 05		
c.	9b. OTHER REPORT NO(S) (Any other number that may be assigned this report)	
d.	AD 738 838	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>This report describes an investigation to evaluate Republic Steel ground mat for use in open-storage areas. The corrugated panels, which are 11-1/2 ft long, 3 ft 1-5/8 in. wide, 1 in. thick, and weigh 105 lb each, are connected by overlapping the corrugations and bending tabs into slots. Two test series were run. In test series I, traffic was applied with two forklifts, the Hyster Model RT-150 and the Towmotor Model 940-RS, both carrying various pay loads on three different subgrades, two heavy clay and one sand. Ground mat on the sand section withstood traffic better than that on the clay sections. Static loads with pallets of 6000 to 15,000 lb were placed on the section for periods up to 60 hr, with a maximum settlement of 0.4 in. recorded. In test series II, double layers of mat were placed in two patterns over wet and dry sand. Individual layers were not interlocked. The test sections were trafficked with the RT-150 Hyster, a 2-1/2-ton M35 truck, and a 5-ton M54 truck. The Hyster was the most critical load applied. It was concluded that the single-layer ground mat was inadequate for use in open-storage traffic areas. Double layers nested together will perform satisfactorily with continued maintenance over a period of 2 to 3 months. It is recommended that the mat be oriented so vehicles travel perpendicular to the corrugations in heavily trafficked areas.</p>		
KEYWORDS: Ground matting; Open storage areas; Steels; Traffic tests		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

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Unclassified

Security Classification

U. P.

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
GROUND-FLOTATION INVESTIGATION OF MODEL WIDE TIRE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final Technical Report		
5. AUTHOR(S) (First name, middle initial, last name)		
Watkins, James E. Hill, Webster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1967	79	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
MIPR AS-4-177	Miscellaneous Paper No. 4-940	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 822 345L; AFFDL-TR-67-11	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; December 1971. Other requests for this document must be referred to Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, Ohio.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Air Force Flight Dynamics Laboratory Research and Technology Division AF Systems Command, WPAFB, Ohio
13. ABSTRACT		
<p>This report describes work undertaken as part of an overall program to develop ground-flotation criteria for the C-5A aircraft. A test section was constructed to a width adequate for seven similar test lanes. Each lane was divided into two unsurfaced items having different subgrade CBR values. Traffic was applied by a model wide tire, a multiwheel assembly, and a conventional single-wheel assembly. The same load and tire pressure were maintained for all tests. This report presents a description of the test section and wheel assemblies, and gives soil strengths, drawbar pull, and surface deformations and deflections. Also, the number of traffic passes completed before failure occurred on each test item is given. An analysis of traffic data, with conclusions, is presented.</p>		
KEYWORDS: Aircraft; Aircraft tires; Ground flotation; Pneumatic tires		

DD FORM 1473

NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
COMPARATIVE PERFORMANCE TESTS OF AM2 MAT FROM VARIOUS EXTRUDERS AND FABRICATORS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns Walter R. Barker		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1967	39	2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper No. 4-954	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 739 506	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT This investigation was conducted to evaluate and compare the performance of AM2 mat fabricated by Washington Aluminum Co., Enterprise, Ala., from extrusions made by Kaiser, Dow, and Alcoa with that of AM2 mat extruded and fabricated by Harvey Aluminum Co., Torrance, Calif. A test section consisting of one sand subgrade item and two clay subgrade items with various CBR strength values was constructed and surfaced with the mats. The test section was subjected to traffic with a test load cart equipped with a single-wheel gear assembly with 400-psi tire pressure, loaded and operated to simulate various operations of a fighter-type aircraft on a landing mat runway. Based on the results obtained in this study, it is concluded that: a. The performance of AM2 mat is greatly influenced by the quality of weld at end joints. The welds on the Dow and Alcoa mat extrusions as initially fabricated by Washington Aluminum Co. were of poor quality and resulted in early mat failures. However, modifications of the welding procedure by Washington Aluminum Co. resulted in very satisfactory mat from the same extrusions. b. The greater web thickness in the core of the Kaiser mat extrusions resulted in a stronger mat core that will sustain a larger number of load repetitions (passes) in a single track than will any of the other mats tested. c. All mat extrusions tested will meet the minimum SATS requirements for AM2 mat, provided proper fabrication and welding techniques are followed.		
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [AM2 landing mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station, CE Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		2b. GROUP
TESTS OF EXPEDIENT RAMP TO CARRY OVER-THE-BEACH TRAFFIC		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Victor C. Barber		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1968	50	2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper No. 4-966	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 741 615	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers Washington, D. C.
13. ABSTRACT		
<p>Engineer tests were conducted on a full-scale model beach in a wave tank of the WES Hydraulics Division. The beach was constructed of sand approximating that found on beaches in the SE Asian theater of operations (TO). Beach slopes ranged from 10 to 20 percent. Waves induced upon the beach simulated those found in TO cove and bay areas. The tests were conducted by installing various types of expedient surfacing materials such as M6 pierced steel plank landing mat and XM19 aluminum landing mat with and without anchors and with and without T16 membrane over a prepared sand beach and subjecting these installations to wave action and vehicular traffic. The separate ramps were tested by first observing detrimental effects caused by wave action alone and then by a combination of wave action and traffic loading. These same factors were observed in determining detrimental effects of traffic and waves on a bare beach. Standard military vehicles used in the trafficking cycles were the M151 1/4-ton cargo truck and the M35 2-1/2-ton 6x6 cargo truck. None of the materials or combinations thereof satisfactorily stabilized the beach foreshore or provided an OTB ramp appreciably better than the natural, bare sand. Benefits gained by installation of any of these OTB ramps are short-term due to the rapid deterioration of the ramp foundation.</p> <p>KEYWORDS: Aluminum landing mats; Beach trafficability; Expedient surfacings; Membranes; Scale models; Steel landing mats; Traffic tests</p>		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PERFORMANCE AND LABORATORY TESTS OF M8A1-A STEEL LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Dewey W. White, Jr.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1968	74	4 (in text)
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1-V-0-21701-A-046	Miscellaneous Paper No. 4-967	
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 830 088	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation of modified M8A1 mat (designated as M8A1-A). M8A1-A mat panels contain a 1/8-in. joggle along the rolled-box edge to eliminate excessive tire damage for aircraft operating on this mat. Traffic tests, skid-resistance and tire-wear tests, and laboratory strength tests were conducted. Comparisons were made of M8A1-A mat, T10 mat, and M8A1 mat made by various manufacturers. The effect of the joggle on performance of the M8A1-A mat was not fully determined due to the premature and unexpected failure of the mat at the locking lugs opposite bayonet 15. The performance of the T10 mat was satisfactory since no failures occurred. There was no significant difference in performance of the M8A1-A and M8A1 mats (i.e. mats with and without the joggle, respectively). No appreciable tire damage occurred in any of the skid tests; tire wear was reasonably uniform for all three mats tested and was not considered excessive. No significant difficulty was encountered in an interchangeability test on the three types of mat; however, it would be desirable not to place M8A1 and M8A1-A mats in the same runs. The M8A1-A sheet and end-connector bar material met the specification requirements. Based on these findings, it is believed that modification of the rolled-box edge to incorporate a joggle is not warranted.		
KEYWORDS: Landing mats; Steel landing mats; Tire tests; Traffic tests; [M8A1-A landing mat]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

270

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
STABILIZATION OF SHIFTING SAND			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report (supersedes a preliminary report dated February 1968)			
5. AUTHOR(S) (First name, middle initial, last name)			
George R. Roman			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
March 1968	69	None	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)		
	Miscellaneous Paper No. 4-968		
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
	AD 829 653		
c.			
d.			
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army	
13. ABSTRACT			
<p>In response to a request by the Office, Chief of Engineers, an accelerated test program was planned and executed by the U. S. Army Engineer Waterways Experiment Station during the period 5-19 February 1968. The general purpose of the test program was to determine the best readily available means of stabilizing areas of flat and mounded sand to resist the effects of wind and water erosion. The scope of the test program included (a) examination of three potential stabilizer materials (UCAR-131, Dynatech Formulation 226, and a polypropylene fabric impregnated with asphalt emulsion), (b) fabrication and investigation of various equipment capabilities for applying the selected materials, and (c) construction and testing of field test sections to demonstrate the materials and equipment capabilities. A laboratory investigation was performed to determine the effectiveness of the selected materials in stabilizing sand, to establish appropriate field usage parameters, and to examine the influence of environment factors such as temperature, humidity, and quality of available water for duration on the stabilizing capabilities of the materials. Distribution equipment was studied and assembled to provide capabilities for spraying sand mounds with an asphalt distributor, hand-held hoses, and a back-pack sprayer. Field test sections were constructed and tested, under extremely adverse climatic conditions, to demonstrate the capabilities for stabilizing sand. It was generally concluded that all three of the materials examined and all of the items of equipment assembled can be used effectively to stabilize sand for the intended purpose, provided they are used correctly and under conditions appropriate to the achievement of maximum results.</p> <p>KEYWORDS: Emulsions; Erosion control; Polypropylene asphalt membrane; Sands; Soil stabilization</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Source of Information

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Michael Army Airfield, Dugway Proving Ground, Dugway, Utah]

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, ROBERT GRAY ARMY AIRFIELD, FORT HOOD, TEXAS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF FIGS	
April 1966	5		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO.	Miscellaneous Paper No. 4-989		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.	AD 739 296		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT			
<p>The purpose of this report is to present the results of an inspection performed at Robert Gray Army Airfield (RGAAF) in June 1967. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways. A layout of the airfield is shown in plate 1.</p>			
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Robert Gray Army Airfield, Fort Hood, Texas]</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE TRAFFICABILITY TESTS WITH MAJOR/MINOR WHEEL VEHICLE EQUIPPED WITH 16x14.5-6 TIRES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) James H. Robinson Edgar S. Rush		
6. REPORT DATE September 1968	7a. TOTAL NO. OF PAGES 49	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper M-68-4	
8. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 841 855	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Limited War Laboratory Aberdeen Proving Ground, Maryland
13. ABSTRACT <p>The major/minor wheel vehicle, an experimental vehicle that employs the Terrastar locomotion concept, was tested on soils having a wide range of strengths, on asphalt pavement, and in water. The purpose of the tests was to determine (a) the minimum soil strength, in terms of rating cone index, that will permit the vehicle to complete one and 50 passes in a straight-line path (i.e. the vehicle cone index for one pass, VCI_1, and 50 passes, VCI_{50}), (b) one-pass drawbar pull-slip and motion resistance-soil strength relations, (c) hard surface drawbar pull-vehicle speed relations, (d) slope-climbing capabilities, (e) water speed, and (f) water exit capabilities. Mechanical breakdowns prevented completion of some portions of the test program. The experimental VCI_{50} was determined to be 21 and the experimental VCI_1 to be 8. This compares favorably with the computed VCI_{50} of 27 and computed VCI_1 of 14. The maximum drawbar pull on a paved surface was 65 percent of vehicle weight; the maximum drawbar pull on soil was about 57 percent of vehicle weight. Maximum drawbar pull and motion resistance were shown to be related to soil strength. The maximum water speed was 3.0 mph. Appendix A presents the formula and computations for determination of the vehicle cone index.</p> <p>KEYWORDS: Field tests; Movility; Pavements; Terrastar locomotion concept; Trafficability; Water performance</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CONDITION SURVEY, SHERIDAN ARMY AIRFIELD, FT. SHERIDAN, ILLINOIS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros		
6. REPORT DATE May 1968	7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper No. S-68-1	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.	AD 730 917	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers Washington, D. C.
13. ABSTRACT The purpose of this report is to present the results of an inspection performed at Sheridan Army Airfield (SAAF) in June 1967. The inspection was limited to visual observations, and not tests were conducted on the existing runways and taxiways.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Sheridan Army Airfield, Ft. Sheridan, Illinois]		

DD FORM 1473
1 NOV 65

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OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
1. Sponsoring Military Activity (Signature authority)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		20. REPORT SECURITY CLASSIFICATION Unclassified
23. GROUP		
3. REPORT TITLE CONDITION SURVEY, LIBERTY ARMY AIRFIELD, FT. STEWART, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros		
6. REPORT DATE May 1968	7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-68-2	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 730 918	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT The purpose of this report is to present the results of an inspection performed at Liberty Army Airfield (LAAP) in June 1967. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Liberty Army Airfield, Ft. Stewart, Georgia]		

20 NOV 68 11:10
REPLACES DD FORM 1475, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF DOW CHEMICAL EXTRUDED LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Hugh L. Green Gordon L. Carr		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1968	47	6
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)
A. PROJECT NO. 1T021701A046-05		Miscellaneous Paper S-68-9
C.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
D.		AD 838 926
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>This report describes an investigation conducted to evaluate an experimental quantity of extruded aluminum alloy landing mat. The mats, which were designed and fabricated by the Dow Metal Products Division of the Dow Chemical Co., Midland, Mich., are one-piece hollow extrusions fabricated from 6061 (designated MX18-B) and 7005 (designated MX18-C) aluminum alloys, artificially aged to the T6 condition. The panels are interlocked along the sides by means of a hinge-type connector, the components of which are an integral part of the basic panel extrusion. End connectors are composed of extruded connectors welded to the basic panel, and consist of an overlap and underlap section secured by a locking bar after individual panels have been joined together. This investigation consisted of traffic tests to obtain information for use in comparing the performance of the mats with project requirements. The traffic tests were conducted on a prepared subgrade, with a rolling wheel load simulating actual aircraft operations. These tests were conducted with a 25,000-lb single-wheel load with a tire inflation pressure of 250 psi on a mat-surfaced subgrade with a rated CBR of 3.7 and 4.0 for the MX18-B and MX18-C, respectively. The MX18-B was considered marginal as it just met the project requirement of 200 coverages on a 4-CBR subgrade. The MX18-C exceeded the traffic criteria by 35 percent and was considered desirable. Test data reported herein were evaluated against criteria for medium mat established in January 1965 by the U. S. Army Materiel Command and summarized in Appendix A. The criteria were subsequently revised, and an updated qualitative materiel requirement was approved on 2 April 1968. Further study and testing are needed to develop ancillaries to expedite mat placement and field serviceability. It is recommended that the fabricator incorporate the described improvements in the mats and exercise the fabrication controls discussed herein, and also that the mats be service tested to validate the findings of the engineer design tests.</p>		
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); [XM18-B (Landing mat); XM18-C (Landing mat)]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE EVALUATION OF LOAD-DISTRIBUTING CAPABILITY OF T17 MEMBRANE IN ROAD CONSTRUCTION		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns James L. McCall, Jr.		
6. REPORT DATE July 1968	7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-68-10	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.	AD 837 424	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This study was conducted to determine if T17 neoprene-coated nylon membrane is effective in increasing the load-carrying capability of a soil when used in road and air-field construction. A test section approximately 15 ft wide and 100 ft long was constructed as a two-layered system consisting of a uniform-strength base (CBR \approx 10) and a uniform-strength subgrade (CBR \approx 4). The test section was divided into four test items, each 25 ft long. One item involved no membrane, but T17 membrane was used in various manners on the other three items. A total of 100 coverages of traffic was applied on the test section with a test load cart equipped with a 25,000-lb single-wheel load assembly with the tire inflated to produce a contact pressure of 100 psi. Comparative performance of the various test items was observed. The results of the tests indicated that no significant load-distribution benefits were derived from the membrane.		
KEYWORDS: Membranes; Nylon fibers; Traffic tests; [T17 membranes]		

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Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		Unclassified
2. REPORT TITLE		2b. GROUP
EVALUATION OF MAY TWO-PIECE AM2 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Robert W. Grau		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1968	55	1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-68-11	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 730 728	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Engineering Center Philadelphia, Pa.
13. ABSTRACT		
<p>This investigation was conducted to evaluate two-piece AM2 landing mat extruded and fabricated by May Aluminum, Inc., El Campo, Texas. The mat was fabricated from two 12-in.-wide extrusions welded together to form a 2-ft-wide plank. A test section consisting of one sand and two clay subgrade items with various CBR strength values was constructed and surfaced with the mat. The test section was subjected to uniform-coverage and single-line traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb with a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that: a. The May two-piece AM2 will sustain 1600 cycles (188 coverages) of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire-inflation pressure when placed on a subgrade having a CBR of 4.1 or greater throughout the period of traffic. b. The May two-piece AM2 will sustain 1600 passes of a 27,000-lb single-wheel load with a tire-inflation pressure of 400 psi in a single path located 1-1/2 ft or more from the mat end joints when placed on a subgrade having a CBR of 4.3 or greater throughout the period of traffic. c. General behavior of the mat in these tests was not materially affected by the two-piece nature of the planks.</p>		
KEYWORDS: Aluminim landing mats; Traffic tests; [AM2 landing mat; May Aluminum, Inc.]		

DD FORM 1473
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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
MEMBRANE-ENVELOPE TECHNIQUE FOR WATERPROOFING SOIL BASE COURSES FOR AIRSTRIPS; Bare Base Support		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final Report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William N. Brabston		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1968	78	3
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-68-13	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 684 356	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Air Force
13. ABSTRACT		
<p>The purposes of the investigation reported herein were to (a) determine the techniques required to construct a waterproof fine-grained soil base course by encasing the soil layer in a protective membrane envelope, (b) evaluate several types of membranes for use in this waterproofing techniques, and (c) determine the effects of aircraft traffic under a range of weather conditions on a base course so constructed. A test section was constructed having (a) a highly compacted lean clay base course over a low strength subgrade of the same soil, and (b) a heavy clay base course over a loose sand subgrade. During construction, various surface and subsurface membranes were bonded together to form a single watertight envelope encasing both base courses. The initial strengths of the top 6 in. of the lean clay and the heavy clay were approximately 32 and 31 CBR, respectively. The test section was trafficked with a simulated F-4C aircraft loading. Traffic was applied intermittently for a 7-1/2-month period. From the results of this study, it was concluded that: a. A fine-grained soil base course can be successfully protected from water intrusion by encasement in a protective membrane envelope. This can be accomplished in the field using the techniques and equipment described herein. b. T1 and T2 membranes are not satisfactory for use as surfacing on a tactical assault field of this type. T16, T17, or WX18 membranes will withstand the abrasive action of a free-rolling F-40 aircraft wheel. However, a recently completed comparison study indicated that only the WX18 has sufficient tear strength to sustain braking and short-radius turns of F-4C aircraft. c. All subsurface membranes used in the tests reported herein were effective in waterproofing, but the T16 was more durable than the lighter membranes and less subject to damage during construction.</p> <p>KEYWORDS: Bare base support; Landing strips; Membrane enveloped soil layer; Membranes; Waterproofing</p>		

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Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF THIN STEEL MEMBRANES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) James E. Watkins		
6. REPORT DATE October 1968	7a. TOTAL NO. OF PAGES 55	7b. NO. OF REFS 3
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-68-20	
b. PROJECT NO. 1T021701A046-05		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 846 175L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; December 1971. Other requests for this document must be referred to U. S. Army Materiel Command.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This investigation was conducted to evaluate the load-distributing capability of thin, very high-strength steel membrane. A test section was constructed of uniform-strength heavy clay and surfaced as follows: 15-mil steel membrane, 11-mil steel membrane, and neoprene-coated nylon membrane placed directly on the subgrade; 15-mil steel membrane over subgrade sprayed with an asphalt tack coat; and one unsurfaced area. The test section was trafficked with a test cart with a 20.00-20.00, 22-ply C-130 aircraft tire inflated to 85 psi loaded with 30,000 lb. Observations and tests were made to evaluate the performance of the various membranes and the subgrade. Laboratory tests of the tensile strength of the steel membranes were made. Based on the results obtained by this study, it was concluded that: (a) when placed on a subgrade of 5- to 6-CBR strength and trafficked with the load cart described above, neither the 11-mil nor the 15-mil steel membrane exhibited any appreciable load-distributing capacity; (b) application of an asphalt tack coat on the subgrade did not materially improve the performance of the steel membrane; (c) although very high in tensile strength, the steel membranes used in this test did not withstand the differential stresses and flexing imposed by rolling-wheel traffic.		
KEYWORDS: Clays; Load tests; Membranes; Steels; Subgrades		

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1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
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Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
AN INVESTIGATION OF THE CEMENT REQUIREMENTS FOR SOIL CEMENT COMPACTED TO MODIFIED MAXIMUM DENSITY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Jon E. Windham		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1968	72	29
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
B. PROJECT NO. 1-L-0-13001-A-91A	Miscellaneous Paper S-68-25	
C. Item 2	9a. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
4.	AD 730 736	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
MS Thesis, Mississippi State University June 1967		Assistant Secretary of the Army (R&D) Department of the Army Washington, D. C.
13. ABSTRACT		
<p>The purpose of this investigation was to investigate the possibilities of developing a laboratory test for soil cement using specimens compacted to CE #100 modified maximum densities. Standard ASTM freeze-thaw, wet-dry and compressive strength tests for soil cement were conducted on specimens compacted to 100 percent and 96 percent CE modified maximum densities at modified optimum moisture content and specimens compacted to standard (ASTM D-668) maximum densities at standard optimum moisture contents in order to correlate the durability and compressive strengths of the specimens. The group of specimens compacted to 96 percent modified CE densities were incorporated to determine what would happen if 100 percent modified densities were aimed at and some density less than this was obtained. Length change and pulse velocity were measured during freeze-thaw and wet-dry testing, and pulse velocities were measured on the compressive strength specimens. This investigation was conducted for two types of soil, a clayey sand (A-2-4) and silty clay (A-7-6).</p>		
KEYWORDS: Compaction requirements; Soil cement		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
1. ORIGINATING AGENCY (Agency authority)		2. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		4. GROUP
CONDITION SURVEY, DAVIDSON ARMY AIRFIELD, FORT BELVOIR, VIRGINIA		
5. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
6. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
7. REPORT DATE	8. TOTAL NO. OF PAGES	9. NO. OF REFS
November 1968	3	
10. CONTRACT OR GRANT NO.	11. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-68-26	
c.	12. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 730 919	
13. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
14. SUPPLEMENTARY NOTES		15. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
16. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Davidson Army Airfield (DAAF) in June 1967. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Davidson Army Airfield, Fort Belvoir, Virginia]</p>		

Unclassified
Security Classification

Security Classification

(Security classification of title, body of abstract and indexing) Annotation must be entered when the overall report is classified.

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Security Classification:

Unclassified

Security Classification

M.P.

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
A GENERAL THEORY OF STRESSES AND DISPLACEMENTS IN ELASTIC AND VISCOELASTIC LAYERED SYSTEMS		
4. DESCRIPTIVE NOTES (Type of report and Inclusive Dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Yu-Tang Chou		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1969	80	8
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1T061102B52A	Miscellaneous Paper M-69-8	
c. Task 01	9a. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 900	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
Published in Transactions of the 15th Conference of Army Mathematicians, June 1969; Report ARO-D, No. 70-1, USARO.		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>The analysis of linear viscoelastic layered systems under any axially symmetrical, time-dependent surface traction is presented. Inertial effects are disregarded, and solutions are obtained for the normal, radial, and shear stresses, vertical deflection, and radial displacements at any point within the half space in multilayered systems. Solutions in layered elastic systems first are obtained by using the Love's stress function and the Fourier-Henkel transformation. Solutions in viscoelastic cases then are obtained by using the elastic-viscoelastic correspondence principle, in which the Laplace transformation is applied to replace the time variable with a transformed variable, and thus change the viscoelastic problem into an associated elastic one. The solution of the associated elastic problem, when transformed into the real time variable, will give the desired viscoelastic solution. Sample numerical results are presented. The analysis is an essential step in the development of a rational method of design for flexible pavements, since such pavement systems respond in a markedly time-dependent fashion.</p>		
KEYWORDS: Displacement; Flexible pavements; Layered systems; Stress-strain relations; Viscoplasticity method		

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REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

AD-A045 025

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG--ETC F/G 1/5
A BIBLIOGRAPHY WITH ABSTRACTS OF U.S. ARMY ENGINEER WATERWAYS E--ETC(U)
AUG 77 M P MEYER, V DALE
PSTIAC-5-VOL-2-PT-1

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4 of 5

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Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE MATERIALS INVESTIGATED FOR DUST-CONTROL PROGRAM (SOUTHEAST ASIA)			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Dewey W. White, Jr. Joseph L. Decell			
6. REPORT DATE January 1969		7a. TOTAL NO. OF PAGES 182	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-1	
b. PROJECT NO. 1V021701A046-05			
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 848 430	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT This report describes an investigation to evaluate the use of some asphalt and latex emulsions, mulches, erosion-control blankets, lightweight membranes, and filter blankets as means of controlling dust in the Southeast Asia theater of operations. These materials were subjected to helicopter downwash blast, fire, rain, waterproof, and random vehicle traffic tests. The helicopter tests consisted of placing the materials on three different soils, dry sand, clayey silt, and heavy clay, contained in three test carts with each material placed on each soil. Materials that required a cure period were allowed to cure at ambient conditions for 4 hr prior to tests. Each material then was subjected to simulated disk loadings of 6.0, 7.5, 9.0, and 10.5 lb/sq ft until failure or for a minimum of 1 min. Eight oz of JP-4 jet fuel was poured on a material and ignited, and the observation was made whether the material continued to burn after the fuel had been consumed. After the helicopter downwash blast tests had been completed, the materials were subjected to simulated rainfall of 1 in./hr for 1 hr to determine the effects of the rain. The material was then resubjected to the helicopter downwash blast tests. Each material was placed on soil and a known amount of water was placed on it during the waterproof test. The time required for the water to pass through was recorded, and the amount of water that passed through was measured. The materials were subjected to random vehicle traffic tests on a test section 10 by 60 ft with four 15-ft-long items with different soils, loose sand and clayey silt, compacted clayey silt, and heavy clay (one soil type per item). KEYWORDS: Dust control; Expedient surfacings; Materials; Military operations; [Southeast Asia]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

2x6

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
ENGINEERING TESTS OF HARVEY 1- BY 6-FT LANDING MAT WITH INTEGRAL END CONNECTORS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Charles T. McCormick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1969	31	6
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1T021701A046	Miscellaneous Paper S-69-2	
c. Task No. 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 849 108	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>This report describes an investigation conducted to evaluate an extruded aluminum alloy landing mat fabricated by Harvey Aluminum, Inc., Torrance, California. The 1- by 6-ft mat is a one-piece hollow extrusion fabricated from 6061 aluminum alloy artificially aged to the T6 condition. The main feature of the mat was the incorporation of a nonwelded end joint, which was an integral part of each panel. Individual panels were joined together at the end joints by H-shaped extruded aluminum locking bars. This investigation consisted of traffic tests to obtain information for use in comparing the performance of the experimental mat with project requirements, and to determine the feasibility of fabricating mat with this type of end connector. A test section consisting of a heavy clay subgrade (rated CBR of 3.6) surfaced with the Harvey mat was trafficked with a rolling wheel load simulating actual aircraft operations. The tests were conducted using a load cart with a single-wheel load of 25,000 lb and a tire inflation pressure of 250 psi. The test section failed after eight coverages due to the tire hazard caused by end-joint curling. Since there was no other apparent damage to the mat, it was decided to modify the mat and continue traffic. All panels in the traffic lane were removed, and the corners formed by a female connector and an end joint were cut off. The panels were relaid in their original location and traffic was continued. The section was considered failed after 100 coverages due to severe curling and dishing along end joints and female connectors. Strength evaluation of the mat indicated that the mat, as fabricated, would support 12 coverages of the 25,000-lb single-wheel load if placed on a subgrade with a rated CBR of 4.0. Evaluation of the mat after modifying the end joints indicated that the modified mat was capable of supporting about 140 coverages of the 25,000-lb load. Therefore, neither the mat as fabricated nor the modified mat would meet the service life criterion of 200 coverages. KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [Harvey Aluminum, Inc.]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF WASHINGTON ALUMINUM COMPANY, INC., PRODUCTION AM2 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns Denis P. Wolf		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF NEPS
January 1969	39	1
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-3	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
• Project Order 8-4050	AD 730 731	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Engineering Center Philadelphia, Pa.
13. ABSTRACT		
<p>This investigation was conducted to evaluate the performance of AM2 landing mat from production-line fabrication by Washington Aluminum Company, Inc. (WACO), Baltimore, Md. A test section, consisting of two clay subgrade items with different strengths and one sand item, was constructed and surfaced with the AM2 mat. The test section was subjected to traffic representing 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this investigation, it is concluded that (a) the AM2 mat will sustain 1600 cycles (188 coverages) of uniformly distributed aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a clay subgrade having a CBR of 4.0 or greater, (b) the AM2 mat will sustain 1600 passes of a 27,000-lb single-wheel load with 400-psi tire inflation pressure applied in a single path when placed on a clay subgrade having a CBR of 4.2 or greater, with slight core damage occurring in a small percentage of the planks, and (c) the AM2 mat will sustain 1600 passes or 188 coverages of a 27,000-lb single-wheel load with 400-psi tire inflation pressure when placed on a loose sand subgrade.</p>		
KEYWORDS: Aluminum landing mats; Traffic tests; [AM2 landing mats, Washington Aluminum Company, Inc.]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF DOW CHEMICAL EXTRUDED ALUMINUM LANDING MAT (MODIFIED MX18-B)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Leland R. Lenzner		
6. REPORT DATE February 1969	7a. TOTAL NO. OF PAGES 40	7b. NO. OF REFS 8
8a. CONTRACT OR GRANT NO. a. PROJECT NO. 1T062103A046-05		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-4
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.	AD 849 107	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT The investigation reported herein was conducted to evaluate an extruded aluminum alloy landing mat, designated modified MX18-B, which was produced under contract No. DA-22-079-eng-467 (Neg). This mat was also tested at Dyess AFB, Texas, in an integrated engineering and service test. The modified MX18-B, which was designed and developed by the Dow Metal Products Division of the Dow Chemical Company, Midland, Michigan, is a one-piece extrusion fabricated from 6061 aluminum alloy artificially aged to the T6 condition. The panels are interlocked along the sides by a hinge-type connector, the components of which are an integral part of the basic panel extrusion. End connectors are composed of extruded connectors welded to the basic panel and consist of an overlap and underlap section secured by a locking bar after individual panels have been joined together. Accelerated traffic tests were conducted on a prepared subgrade, with a rolling wheel load simulating actual aircraft operations. In order that the effects of traffic on the mat could be determined, the mat in item 1 was placed in the normal pattern with the longitudinal (side) joints perpendicular to traffic and in item 2 with the longitudinal joints parallel to traffic. Tests were conducted with a 25,000-lb single-wheel load, with a tire inflation pressure of 250 psi, on a mat-surfaced subgrade with rated CBR's of 3.4 and 3.5 for items 1 and 2, respectively. The modified MX18-B mat in item 1 sustained 350 coverages of traffic, which was equivalent to 670 coverages on a 4-CBR subgrade and exceeded the project requirements (200 coverages on a 4-CBR subgrade) by 235 percent. The modified MX18-B mat in item 2 sustained 200 coverages of traffic, which was equivalent to 325 coverages on a 4-CBR subgrade and exceeded project requirements by 62.5 percent. Skid tests were performed on both dry and wet surfaces with a pneumatic-tired, two-wheeled load cart. KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Load tests; [Modified MX18-B landing mat]		

DD FORM 1473 1 NOV 66 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF MO-MAT GROUND COVER FOR USE IN ARMY DEPOT OPEN-STORAGE AREAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Hugh L. Green Charles J. Gerard		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1969	61	None
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO. 1T062103A046-05	Miscellaneous Paper S-69-5	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 848 114	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation to evaluate a fiber glass-reinforced plastic material (STRATOGLAS) molded into a waffle-like configuration for use in Army depot open-storage areas. The mat, termed MO-MAT, was designed and fabricated by Air Logistics Corp., Pasadena, Calif. Individual panels are 50 ft long, 11 ft wide, and 0.085 in. thick, and weigh 570 lb. A single layer of mat was investigated in test series I on two different subgrades: a wet sand and a dry, loose sand. Traffic was applied with a Hyster Model RT-150 forklift with payloads of 0, 5000, 10,000, and 15,000 lb; a 2-1/2-ton M35 cargo truck with 35-psi tire pressure and a gross weight of 18,000 lb; a 5-ton M54 cargo truck with 35-psi tire pressure and a gross weight of 30,000 lb; and a Towmotor Model 540-RS forklift without a payload. A total of 8 cycles was completed on the test section, with 3870 passes applied to the high-intensity traffic areas. The Hyster RT-150 with the 15,000-lb payload was the most critical load. Minor maintenance was necessary on the test section during the investigation. In test series II, the single layer of mat was placed on two heavy clay subgrades: one with a CBR of 3 and one with a CBR of 6 to 7. Traffic was applied with the Hyster RT-150 forklift with payloads of 0, 5000, 10,000, and 15,000 lb. Eight cycles of traffic were applied to the test area, with a total of 4390 passes of traffic applied to the mat with the test vehicle. The most critical load, again, was the Hyster RT-150 with a 15,000-lb payload. Minor maintenance was again necessary. From these tests it was concluded that a single layer of MO-MAT was adequate as tested for use in Army depot open-storage areas, except on low-strength material (CBR of 3 or less). There was no distinct difference between the performance of the mat when placed on a dry sand or a wet sand. KEYWORDS: Fiber reinforced plastics; Ground matting; Open storage areas; [MO-MAT]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE INVESTIGATION OF ENZYMATIC MATERIALS FOR SOIL STABILIZATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) George R. Kozan Jackson H. Ables John D. Stouffer		
6. REPORT DATE February 1969	7a. TOTAL NO. OF PAGES 56	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-9	
b. PROJECT NO. 1T021701A046		
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 850 629L	
d.		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; December 1971. Other requests for this document must be referred to U. S. Army Materiel Command.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT A need exists for soil-stabilizing materials capable of improving soils by providing strength, waterproofing, and alleviation of dust in support of military road and air-field operations. Laboratory and field investigations were conducted on two proprietary enzymatic materials to determine their potential for military soil-stabilization purposes. Laboratory tests showed that neither of the two enzymatic products was capable of satisfying requirements as a dust palliative when applied as a surface-penetration treatment. Subsequent tests of one of the products as a soil-compaction aid showed no benefits to a clayey silt with respect to densification, strength, water requirements for compaction, water-retention properties, or soil waterproofing. Two roadway test sections, one untreated for control and one treated with one of the enzymatic products, were constructed and trafficked by a military vehicle. Measurements and observations made during construction and traffic testing showed no significant difference between treated and untreated sections with respect to strength both as-constructed and that which developed with time, surface abrasion and dust generation under traffic on dry surfaces, or ability to support traffic under wet conditions. It is concluded that these enzymatic materials have no potential for military soil-stabilization purposes and it is recommended that no further tests of these materials be conducted.		
KEYWORDS: Airfields; Dust control; Materials; Military roads; Soil stabilization; Waterproofing		

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Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF SURFACING MATERIALS FOR FIRM BASE TACTICAL AIRFIELDS; Bare Base Support		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William N. Brabston		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1969	32	1
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-10	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 685 826	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Air Force
13. ABSTRACT		
<p>This project was conducted to find a means of rapidly establishing surfacing on a stable base on tactical assault airfields. Several types of production and experimental membranes were evaluated to determine their ability to withstand abrasive and tearing effects caused by fighter and heavy cargo aircraft tires during ground operations. Related programs and research conducted by the U. S. Army Engineer Waterways Experiment Station were examined to determine existing or potential techniques or materials that could be adapted to the Bare Base requirements for surfacing, and field tests were conducted on the items selected. Materials tested were WX18, a neoprene-coated membrane, T16 membrane, T1 membrane with a double bituminous surface treatment (DBST), and an 11-mil-thick high-strength steel membrane. The materials were subjected to locked-wheel skid and short-radius turn tests using equivalent F-4C and C-130 aircraft wheel loads. Initial skid tests with the F-4C loading were conducted on a subgrade designed for static and rolling F-4C wheel loads. The additional load generated by the locked wheels caused severe rutting and subsequent immobilization of the load wheel. Subsequent tests were conducted successfully in areas with a higher subgrade strength. All materials were subjected to one or more skid tests using F-4C loads. WX18 was also subjected to locked-wheel skid tests using C-130 loads and to short-radius turn tests using F-4C loads. The WX18 membrane successfully withstood all the tests, although the neoprene coating was worn off in several areas. The T16, T1 with DBST, and 11-mil steel membranes were ruptured during skid tests with F-4C loadings. From the results of this study, it was concluded that: (a) WX18 can be used as an expedient surfacing material on an assault airfield with adequate soil strength and will withstand the abrasions caused by ground operations of fighter and heavy cargo aircraft, with minor maintenance required in areas with severe abrasions; (b) T1 with DBST, T16, and 11-mil steel membranes cannot withstand the abrasive effect of locked-wheel skids of fighter aircraft; and (c) the soil strength stipulated by design criteria for assault fields based on static and rolling loads may not be adequate in all cases to provide surfacing that will withstand the increased loads.</p> <p>KEYWORDS: Airfields; Bare base support; Expedient surfacings; Load tests; Membranes (Airfields)</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EXPEDIENT SURFACING AND DRAINAGE OF ROADS, STREETS, AND PARKING AND STORAGE AREAS IN THEATER OF OPERATIONS; Report 1, TESTS CONDUCTED BETWEEN JULY 1966 AND AUGUST 1968		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Report 1 of a series		
5. AUTHOR(S) (First name, middle initial, last name)		
C. D. Burns Victor C. Barber		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1969	47	None
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-11, Report 1	
9. PROJECT NO. 19		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 850 667L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; September 1971. Other requests for this document must be referred to Office, Chief of Engineers HQDA(DAEN-MC).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers Directorate of Military Construction Washington, D. C.
13. ABSTRACT		
<p>Engineer tests were conducted on a test road at the U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss., on materials that seem applicable as expedient surfacing materials on roads in the theater of operations (TO). The test road was constructed as a testing medium that would represent a hastily built road in the TO by using the existing lean clay soil and a minimum of construction effort. The materials to be tested were installed on the test road, exposed to the varying climatological conditions of the Vicksburg area, and subjected to mixed military pneumatic-tired traffic. Vehicles ranged in size from that of the 1/4-ton utility truck (jeep) to the 2-1/2-ton, 6x6 cargo truck. As testing proceeded, data were taken and observations were made for the evaluation of the expedient surfacing materials. It was concluded from the test results that Class 30 Assault Trackway will furnish a load-bearing surface on low-strength areas and that MO-MAT, when properly anchored, will furnish an expedient surface for marginal-strength subgrades. The results also indicated that T16 and T17 membranes will provide dustproofing and waterproofing mediums on adequate-strength subgrades. Where T16 and T17 membranes were tested as surface drainage overflow sections, they performed well in carrying runoff across the roadway and protecting the subgrade from moisture. The most suitable expedient surfacing material in its price and weight range for adequate-strength subgrades was polypropylene membrane with RS-2K cationic emulsion. Because this low-priced, easily installed combination of materials far outperformed all competitive items during tests, it is considered the most significant development of this project. UCAR-131 (now designated DCA-70), SC-70, and Peneprime proved adequate for lightly traveled areas for short duration.</p> <p>KEYWORDS: Expedient surfacings; Membranes; Military operations; Open storage areas; Road construction; Road drainage; Roads</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE EXPEDIENT SURFACING AND DRAINAGE OF ROADS, STREETS, AND PARKING AND STORAGE AREAS IN THEATER OF OPERATIONS; Report 2, TESTS CONDUCTED BETWEEN AUGUST 1968 AND JULY 1969		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Report 2 of a series		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Victor C. Barber		
6. REPORT DATE February 1971	7a. TOTAL NO. OF PAGES 58	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-11, Report 2	
b. PROJECT NO. Q6-1 c. Task 04	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 907 934L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; September 1971. Other requests for this document must be referred to Office, Chief of Engineers HQDA (DAEN-MC).		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Directorate of Military Construction Washington, D. C.	
13. ABSTRACT Engineer tests were conducted on a test road covered with an asphalt-impregnated polypropylene membrane at the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss., to determine the effectiveness of the combined materials as a dustproof, waterproof wearing surface over adequate-strength subgrades and as an encasing membrane used to form a membrane-enveloped soil layer (MESL) in areas where high water tables exist. The polypropylene-asphalt membrane was installed on the test road, exposed to varying climatological conditions prevalent in the Vicksburg area, and subjected to mixed pneumatic-tired traffic of military vehicles. Vehicles used for testing were a 2-1/2-ton, 6x6 cargo or dump truck and a 5-ton, 6x6 cargo or dump truck, both carrying maximum off-highway loads and having appropriate tire pressures. As testing proceeded, data were taken and observations were made for the evaluation of polypropylene-asphalt membrane as an expedient surfacing material. It was concluded from the test results that (a) polypropylene-asphalt membrane will furnish a waterproof, dustproof wearing surface to any otherwise satisfactory subgrade for periods in excess of 2 years and will sustain many thousands of repetitions of pneumatic-tired convoy traffic without suffering significant damage, and (b) MESL construction is effective in providing a stable roadway in areas having poor drainage and high water tables. KEYWORDS: Expedient surfacings; Membrane enveloped soil layer; Military operations; Military roads; Open storage areas; Polypropylene asphalt membrane; Road construction; Road drainage; Roads		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF HARVEY ELECTRON BEAM WELDED AM2 LANDING MAT (AM2 MOD 2)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns Denis P. Wolf		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1969	26	1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-13	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 730 741	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT		
<p>The investigation reported herein was conducted to evaluate the performance of the electron beam welded AM2 landing mat fabricated by Harvey Aluminum, Inc., Torrance, California. A test section consisting of a heavy clay subgrade was constructed and surfaced with the electron beam welded AM2 mat, which will be known as AM2 mod 2. The test section was subjected to traffic representing 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this investigation, it is concluded that: (a) the AM2 mod 2 mat will sustain 1600 cycles (188 coverages) of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 3.6 or greater throughout the period of traffic, and (b) electron beam welding of the end connectors resulted in considerable improvement in performance of the AM2 mod 2 mat over that of AM2 mat tested previously.</p>		
KEYWORDS: Aluminum landing mats; Traffic tests; [AM2 landing mats; Harvey Aluminum, Inc.]		

DD FORM 1473
1 NOV 65

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

M, E, P

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF NUCLEAR METHODS OF DETERMINING SURFACE IN SITU SOIL WATER CONTENT AND DENSITY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Thomas B. Rosser III Steve L. Webster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1969	36	7
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 4A024401A891	Miscellaneous Paper S-69-15	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 688 079	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>Laboratory tests were conducted to evaluate the accuracy and reliability of measuring surface in situ soil water content and density by the backscatter and direct transmission nuclear methods using a single nuclear device and scaler. The nuclear device functioned as a surface backscatter moisture and density meter or as a direct transmission density probe. To determine the accuracy of the nuclear measurements, it was necessary to know the actual density and water content of the test soil. Boxes were fabricated to exact dimensions, filled with uniformly compacted soil, and weighed, and actual average soil density values were calculated. Five soil types were tested to approximate a full range of possible construction materials. Each soil type was tested at eight different densities and water contents. To obtain comparative results, soil densities of each sample were determined by two accepted conventional methods (sand-cone and water-balloon) for determining density in the field. Test results indicated that in situ densities determined by the direct transmission nuclear method using the factory calibration curve furnished with the device were as accurate as densities obtained by the sand-cone and water-balloon methods. The direct transmission nuclear method using a WES-developed calibration curve provided slightly more accurate density measurements than either conventional method. Densities determined by the surface backscatter nuclear method using both the factory calibration curve and a WES-developed curve were not so accurate as those obtained by the conventional methods. Water contents were obtained by nuclear means and compared with actual water contents determined from oven-dried samples. Using a WES-developed calibration curve, water contents obtained by the nuclear method were sufficiently accurate for most quality control fieldwork. Water contents obtained using the factory calibration curve were not accurate enough for field use. A test procedure for determining surface layer density and water content of soil by nuclear methods is presented in Appendix A.</p> <p>KEYWORDS: Measuring instruments; Nuclear methods; Soil density determination; Water content determination (Soils)</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
EVALUATION OF MODIFIED T11, DOW, U. S. STEEL, ALCOA T11, AND FENESTRA LANDING MATS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Gordon L. Carr		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1969	80	9
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1T062103A046-05	Miscellaneous Paper S-69-17	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 853 531	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes investigations conducted to evaluate six different metal landing mats, as well as two of the mats that were modified after initial testing. Four of the items tested are fabricated from extruded aluminum and two are fabricated from steel. These investigations consisted of engineering traffic tests to obtain information for use in comparing the performance of the mats with project requirements, which are summarized in Appendix A of this report. The traffic tests were conducted on each mat placed on a prepared subgrade with a CBR of approximately 4. These tests were conducted with a single-wheel load of 25,000 lb with tires inflated to 250 psi, and tire contact area of 111.1 sq in. to simulate F-4C aircraft operations. The service life criterion for an experimental mat was 200 coverages. Results of these investigations revealed the following: (a) the U. S. Steel Type 4.5A mat withstood 62 actual coverages on a 4-CBR subgrade, the equivalent of 31 percent of the traffic criterion; (b) the Dow MX18 and modified T11 mats sustained 30 actual coverages, the equivalent of approximately 20 percent of the traffic criterion (40 to 45 coverages, respectively, when related to performance on a 4-CBR subgrade); these mats were considered undesirable; and (c) the Alcoa T11, U. S. Steel Type 3.5A, modified U. S. Steel Type 4.5A, and Fenestra mats failed after 2 to 6 actual coverages. It is recommended that none of these mats be considered for further investigation until the designs are modified as indicated by results of these tests, fabrication techniques are improved, and quality control measures are established. In conjunction with this series of engineer design tests, four other mats were tested and they met the project requirements. These mats were Kaiser honeycomb MX19, Dow MX18-B, Dow MX18-C, and U. S. Steel Type 4.5 Air-Dek. Development of the MX19 and the MX18-B mats is continuing.		
KEYWORDS: Aluminum landing mats; Steel landing mats; Traffic tests		

DD FORM 1473

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Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF EQUIPMENT USED FOR EMPLACEMENT OF EARTH ANCHORS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Charles J. Gerard		
6. REPORT DATE May 1969	7a. TOTAL NO. OF PAGES 24	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-18	
8c. PROJECT NO.		
8d.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 853 865L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; November 1971. Other requests for this document must be referred to Office, Chief of Engineers HODA (DAEN-MC).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers Washington, D. C.
13. ABSTRACT <p>This report describes an investigation conducted to evaluate the performance of various items of equipment used for the emplacement of earth anchors. The earth anchors, used to anchor the edges of landing-mat-surfaced runways, are 24 in. long with a 3/4-in. shank and a 4-in.-diam helical plate. Ten items of equipment, both gasoline and air powered, were tested by driving anchors into a compacted heavy clay (4 to 6 CBR), an undisturbed silt (10 CBR), and a sandy clay (18 CBR). From these tests it was concluded that the Thor No. 62, a pneumatic wood-boring drill, would be the most feasible air-powered item to be used for anchor emplacement. The most feasible gasoline-powered item tested was the Stihl posthole digger. The average pull required to remove the anchors after emplacement was 2040 lb. Since the pneumatic wood-boring drill is more readily available in the components system for an Army Engineer Combat Battalion and can also be used to remove earth anchors, it is recommended that this drill be employed by the combat engineer troops in the field for anchor emplacement.</p>		
KEYWORDS: Anchors (Fasteners); Construction equipment; Landing mats		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
		2b. GROUP	
3. REPORT TITLE			
CONDITION SURVEY, LAWSON ARMY AIRFIELD, FT. BENNING, GEORGIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Alfred H. Joseph Philip J. Vedros			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1969		5	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)	
B. PROJECT NO. Q6-1		Miscellaneous Paper S-69-19	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 888 292	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT			
The purpose of this report is to present the results of an inspection at Lawson Army Airfield (LAAF) in December 1968. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Lawson Army Airfield, Ft. Benning, Georgia]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		13. GROUP	
FIELD PERFORMANCE INVESTIGATION, SUBSURFACE DRAINAGE FACILITIES, ROBERT GRAY ARMY AIRFIELD, FORT HOOD, TEXAS, 17-19 MARCH 1969			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Charles C. Calhoun, Jr.			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
April 1969	10		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO. Q6-1	Miscellaneous Paper S-69-26		
c. Task 04	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d. Work Unit 003	AD 731 112		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT			
<p>The primary purpose of the visit to RGAA was to determine if the subdrains in the vicinity of sta 84+00 (Section B-B, Incl 2) were effectively draining the 7-in.-thick reclaimed base material. This investigation indicated that there is no free water in this material, and it is in effect acting as an impermeable barrier to any water in the 14 in. of new base material. These observations tend to confirm the results of the tests which were the basis for WES not recommending subdrains along the pavement edges.</p>			
KEYWORDS: Airfield drainage; Subsurface drainage; [Robert Gray Army Airfield, Fort Hood, Texas]			

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Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE LANDING MAT OVERLAY ON DETERIORATED PAVEMENT; BARE BASE SUPPORT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns William N. Brabston		
6. REPORT DATE June 1969	7a. TOTAL NO. OF PAGES 77	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-27	
b. PROJECT NO. 3782		
c. Task 63	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 690 801	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Air Force
13. ABSTRACT This study was conducted to develop procedures for overlaying rough, deteriorated pavements, such as old, abandoned airfields or highways, with new landing mat in order to provide an adequately smooth runway or taxiway for the operation of tactical aircraft. An overlay test section was constructed, and traffic simulating the load on a main gear wheel of the F-4C aircraft was applied. The test section comprised six items that involved various combinations of soil overlays which were in turn overlaid by XM18 and XM19 mats and T16 and WX18 membranes. Tests showed that: (a) deteriorated pavements can be overlaid with a soil cushioning layer and new landing mat to provide an adequate surface for operation of aircraft; (b) both fine-grained and granular soils can be used as the leveling or cushioning layer, but both types of material will require protection to prevent pumping of the fines through mat joints during wet-weather traffic operations; (c) T16 membrane placed between soil and mat is quite effective in protecting fine-grained cohesive soil or fine sand from moisture infiltration and pumping action during wet weather; however, when used between soil and mat, neither the T16 nor the heavier WX18 membrane is adequate to withstand the abrasive action of sharp objects in the soil, such as roots, rocks, etc.; (d) a clay gravel cushion can be effectively protected from water infiltration by stabilization with 6 percent portland cement by soil weight; and (e) the optimum thickness of leveling or cushioning material needed for mat overlay construction is the minimum thickness that will (1) provide uniform bearing for the mat, (2) provide an adequate transverse slope or crown (about 2-1/2 to 3 percent), and (3) allow a sufficient quantity of soil so that the material can be easily placed and compacted with the available construction equipment.		
KEYWORDS: Bare base support; Landing mat construction; Membranes; Overlays (Pavements); Pavements		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF XM20 LANDING MAT UNDER MEDIUM-DUTY LOAD		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Charles J. Gerard		
6. REPORT DATE July 1969	7a. TOTAL NO. OF PAGES 44	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-28	
b. PROJECT NO. 1G643324D556	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 856 826	
c. Task 01		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation conducted to evaluate an aluminum alloy landing mat (designated XM20) manufactured by the Dow Chemical Company, Madison, Ill., and, for purposes of comparison, an extruded two-piece aluminum alloy production mat (designated AM2). The XM20 mat is a one-piece hollow extrusion fabricated from 6061 aluminum alloy artificially aged to the T6 condition. The XM20 mat is similar in design to MX18-B mat; however, the internal ribs and the female connector are thickened to add to the design strength of the mat. Both the XM20 and AM2 mats are interlocked along the sides by means of a hinge-type connector, the components of which are an integral part of the basic panel extrusion. End connectors are composed of extruded connectors welded to the basic panel and consist of an overlap and underlap section secured by a locking bar after individual panels have been joined together. This investigation consisted of traffic tests to obtain information on the XM20 experimental mat and to compare the performance of the XM20 mat with that of the AM2 production mat. Laboratory tests were conducted to provide data on the structural properties of the XM20 mats and their component parts. The mat was traffic tested with a rolling wheel load to complete the evaluation of the design and fabrication. The traffic tests were conducted on a prepared subgrade with a rolling wheel load that simulated actual aircraft operations. These tests were conducted with a 25,000-lb single-wheel load with a tire inflation pressure of 250 psi on a mat-surfaced subgrade with initial average CBR's of 3.6 and 3.5 for the XM20 and AM2, respectively. Tests indicated that when placed on a subgrade with a rated CBR of 4, the XM20 would sustain more than 5000 coverages of traffic; the production mat (AM2) would sustain 620 coverages of traffic. It is recommended that further engineer traffic tests be conducted to evaluate the XM20 mat for the revised Qualitative Materiel Requirement for heavy-duty mat.		
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [XM20 landing mat]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF HARVEY NONWELDED ALUMINUM LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Robert W. Grau		
6. REPORT DATE July 1969	7a. TOTAL NO. OF PAGES 43	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-29	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 731 200	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT This investigation was conducted to evaluate the performance of the 1- and 2-ft-wide Harvey nonwelded aluminum landing mats and to compare the performance with that obtained in previous tests on standard AM2 mat. This landing mat was extruded by the Harvey Aluminum Co., Torrance, Calif. Three test sections were built and surfaced with different shipments or types of Harvey mat. The first and second sections were surfaced with 1- by 6-ft and 2- by 6-ft mat, respectively, each over two clay subgrade items with different CBR strength values. The third section consisted of two items surfaced with 2- by 12-ft and modified 2- by 12-ft mat over a subgrade of the same nominal strength as the lower subgrade strength of the first and second sections. All three test sections were subjected to uniform-coverage traffic, and section one was also subjected to single-line traffic. The traffic represented operations of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb with a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that: (a) the Harvey 1- by 6-ft, 2- by 12-ft, and modified 2- by 12-ft nonwelded aluminum mats will sustain 1600 cycles (188 coverages) of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on subgrades having minimum CBR's of 3.7, 4.2, and 4.4, respectively, or greater throughout the period of traffic; (b) the Harvey 1- by 6-ft nonwelded aluminum landing mat will sustain 1600 passes of a 27,000-lb single-wheel load with a tire inflation pressure of 400 psi in a single path located 1-1/2 ft or more from the mat end joints when placed on a subgrade having a CBR of 4.6 or greater throughout the period of traffic; (c) the two sections of 2- by 6-ft nonwelded mat failed early in the traffic period due to extrusion defects and not to the nonwelded joint configuration; (d) the main difference between the performance of the 2- by 12-ft mat and that of the modified 2- by 12-ft mat was that the modified planks shifted more laterally during traffic KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); [AM2 landing mats; Harvey Aluminum, Inc.]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE FLEXIBLE PAVEMENT FOR TOMORROW'S MAJOR AIRPORTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Donald N. Brown George M. Hummitt II Donald M. Ladd		
6. REPORT DATE August 1969	7a. TOTAL NO. OF PAGES 27	7b. NO. OF REFS 8
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-33	
9. PROJECT NO.	9a. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 731 113	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY	
13. ABSTRACT This paper presents flexible pavement thickness design requirements for representative aircraft which tend to control the design of flexible pavements at today's and tomorrow's major commercial airports. These design criteria, developed in accordance with the CBR design procedures used by the Army Corps of Engineers in designing flexible pavements for military aircraft, may be used to predict the effects of tomorrow's aircraft on existing flexible pavements at commercial airports.		
KEYWORDS: Flexible pavement design (Airfields); Pavement thickness		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE JET ENGINE EXHAUST BLAST TESTS ON KAISER XM19 MEDIUM-DUTY LANDING MAT PANELS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) James W. Carr		
6. REPORT DATE September 1969	7a. TOTAL NO. OF PAGES 27	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-35	
b. PROJECT NO. 1G664717D556		
c. Task 01	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 860 358	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Research and Development Directorate U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation conducted to evaluate the effects of high temperatures on Kaiser welded and bonded XM19 mat panels. All panels tested were of the sandwich-type fabrication consisting of an inner core bonded on top and bottom to thin sheets of aluminum. Edge connectors were welded to the top and bottom sheets in one mat and bonded in the other. Panels of each mat were subjected to the exhaust blasts of a J-44 jet engine producing temperatures on the mat surfaces ranging from 300 to 1000 F. A blast impingement angle of 90 deg was used for tests of 1-min duration, and an impingement angle of 5 deg was used for longer blast exposures. Results indicated that both the welded and bonded mats will withstand exposures to blast temperatures as high as 600 F for 1 min without significant loss of strength. It is recommended that these mats be considered capable of meeting the temperature requirement of 300 F for 5 sec as specified for medium-duty landing mats in the Qualitative Materiel Requirement for Prefabricated Airfield Surfacing.		
KEYWORDS: Aluminum landing mats; Exhaust blast effects; Jet blast resistant materials; [Kaiser aluminum mats; XM19 landing mat]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE JET ENGINE EXHAUST BLAST TESTS ON GOODYEAR ALUMINUM MAT PANELS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) James W. Carr		
6. REPORT DATE September 1969	7a. TOTAL NO. OF PAGES 15	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-36	
8c. PROJECT NO. IT062103A046		
8d. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 860 084	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Research and Development Directorate U. S. Army Materiel Command
13. ABSTRACT This report describes an investigation conducted to evaluate Goodyear all-bonded aluminum mat panels when subjected to exhaust blasts of a jet engine. The mat is a sandwich-type fabricated item consisting of an inner core bonded on top and bottom to thin sheets of aluminum. Tests were conducted with a J-44 jet engine to simulate exhaust blasts generated during takeoffs and landings of jet VTOL aircraft. Exhausts at temperatures of 300 to 700 F were allowed to strike the panels at an impingement angle of 90 deg. Test results indicated that the Goodyear panels successfully withstood blast temperatures of 400 F for 1 min with less than a 10 percent decrease in core shear and panel flexural strength. Temperatures of 500 F or higher caused separation of the top sheet of the panel from the panel core. It is recommended that improvement in the bonding technique and/or adhesive be accomplished prior to any further evaluation or use of the Goodyear all-bonded mat.		
KEYWORDS: Aluminum landing mats; Exhaust blast effects; Jet blast resistant materials; Vertical takeoff and landing aircraft; [Goodyear aluminum mats]		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, HUNTER ARMY AIRFIELD, SAVANNAH, GEORGIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Alfred H. Joseph Philip J. Vedros William B. Abbott, Jr.			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1969		3	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. Q6-1		Miscellaneous Paper S-69-37	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 731 641	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT			
The purpose of this report is to present the results of an investigation conducted at Hunter Army Airfield (HAAF) in February 1969. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Hunter Army Airfield, Savannah, Georgia]			

DD FORM 1473 1 NOV 68

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		
1. REPORT SECURITY CLASSIFICATION		Unclassified
2. GROUP		
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION, ROBERT GRAY ARMY AIRFIELD, FORT HOOD, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph William B. Fenwick		
6. REPORT DATE August 1969	7a. TOTAL NO. OF PAGES 13	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-38	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (any other numbers that may be assigned this report) AD 890 782L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; December 1971. Other requests for this document must be referred to Office, Chief of Engineers HQDA (DAEN-MCE-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Headquarters, III Corps, U. S. Army and Fort Hood, Texas
13. ABSTRACT The primary purpose of this study was to establish the load-carrying capacities of the airfield pavements at Robert Gray Army Airfield (RGAAP), Fort Hood, Texas. There is a proposal under consideration for a major rehabilitation of the pavements at RGAAP, and an evaluation was deemed necessary for use in future design. An evaluation of the pavements at RGAAP was made by personnel of the U. S. Army Engineer Waterways Experiment Station (WES) in 1964. Since 1964, portions of the runway have been reconstructed. The field testing discussed herein was conducted to evaluate the reconstructed areas and to validate the results of the 1964 tests. Pertinent data have been extracted from the 1964 evaluation report and are used herein.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Robert Gray Army Airfield, Fort Hood, Texas]		

DD FORM 1 NOV 68 78 REPLACES DD FORM 1273, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - RQD		
1. ORIGINATOR'S ACTIVITY (In appropriate author)		
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi	20. REPORT SECURITY CLASSIFICATION Unclassified	
21. GROUP		
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION, ROBERT GRAY ARMY AIRFIELD, FORT HOOD, TEXAS; SUPPLEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros		
6. REPORT DATE June 1970	7a. TOTAL NO. OF PAGES 3	7b. NO. OF REFS
8. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-69-38; Supplement	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; December 1971. Other requests for this document must be referred to Office, Chief of Engineers HQDA (DAEN-MCE-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Headquarters, III Corps, U. S. Army and Fort Hood, Texas
13. ABSTRACT This supplement presents the results of an evaluation of the pavements that have been reconstructed or overlaid at Robert Gray Army Airfield (RGAAP) during the period August 1969-May 1970. Selection of CBR values for subgrade, subbase, and base-course materials was based on results of past evaluation tests on similar materials. A very good performance prediction correlation has been found by WFS personnel for the airfield facilities at RGAAP, and it is felt that the materials used in the construction discussed in this supplementary evaluation will perform according to the CBR values that were assigned.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Robert Gray Army Airfield, Fort Hood, Texas]		

REPLACES DA FORM 1075, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF XM20 ALUMINUM LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) C. D. Burns R. W. Grau		
6. REPORT DATE September 1969	7a. TOTAL NO. OF PAGES 25	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-39	
8c. PROJECT NO.		
9.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 735 768	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pa.
13. ABSTRACT This investigation was conducted to evaluate XM20 aluminum landing mat fabricated by Dow Chemical Company, Madison, Illinois. The mat, fabricated from 2- by 12-ft extrusions, was similar to AM2 mat except for minor differences in the cross section of the mat and the method used to attach the end connectors to the mat extrusion. A test section consisting of one clay subgrade item at a strength of 4 CBR was constructed and surfaced with the XM20 mat. The test section was subjected to uniform-coverage traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main gear assembly load of 27,000 lb with a 30x7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that: the XM20 mat will sustain 1600 cycles (188 coverages) of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 2.5 or greater throughout the period of traffic, or about 1230 coverages of the same loading when placed on a subgrade having a CBR of 4 or greater throughout the period of traffic; the service life of the XM20 mat on a 4-CBR subgrade is about six times greater than that of standard AM2 mats tested previously at WES on subgrades with a CBR of 4; and general behavior of the mat in this test was greatly improved by the double thickness of the ribs at the end joints of the planks.		
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [Dow Chemical Co.; XM20 landing mat]		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
EVALUATION OF DOW XM18-E AND ALCOA AM2 LANDING MAT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Cecil D. Burns Denis P. Wolf			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1969		39	1
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-69-40	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 735 769	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Naval Air Engineering Center Philadelphia, Pa.	
13. ABSTRACT			
<p>This investigation was conducted to evaluate the performance of Dow XM18-E and Alcoa AM2 landing mat. A test section consisting of a heavy-clay subgrade was constructed and surfaced with the Dow and Alcoa landing mat. The test section was subjected to traffic representing 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb and a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this investigation, it is concluded that: (a) the Dow XM18-E landing mat will sustain 1600 cycles (188 coverages) of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire-inflation pressure when placed on a clay subgrade having a CBR of 3.3 or greater throughout the period of traffic; this performance meets service requirements set by the Naval Air Engineering Center (NAEC); and (b) the Alcoa AM2 landing mat did not meet minimum test requirements set by NAEC.</p>			
KEYWORDS: Aluminum landing mats; Traffic tests; [Alcoa AM2 landing mat; Dow XM18-E landing mat]			

DD FORM 1473 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE EVALUATION OF HARVEY AND KAISER PRODUCTION AM2 LANDING MAT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Robert W. Grau			
6. REPORT DATE September 1969		7a. TOTAL NO. OF PAGES 30	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-41	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 890 515	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pa.	
13. ABSTRACT This investigation was conducted to evaluate Harvey and Kaiser production AM2 landing mat. The Harvey mat was fabricated by Harvey Aluminum, Inc., Torrance, Calif., and the Kaiser mat was fabricated by Washington Aluminum Company (WACO), Enterprise, Ala. Both mats were fabricated from 2-ft-wide extrusions to form 2- by 12-ft or 2- by 6-ft panels and are identified as Harvey and Kaiser AM2 landing mat. A test section consisting of a clay subgrade at a strength of approximately 4 CBR was constructed and surfaced with the two mats. The section was subjected to uniform-coverage traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb with a 30-7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that: (a) the Harvey production AM2 mat will sustain 1600 cycles (188 coverages) of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire-inflation pressure when placed on a subgrade having a CBR of 3.4 or greater throughout the period of traffic; this meets the required service criterion; and (b) the Kaiser production AM2 mat failed to meet the service criterion.			
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [AM2 landing mat; Harvey landing mats; Kaiser landing mats]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION REPORT, HIRSCH AUXILIARY FIELD, LAREDO, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1969	11	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-43	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 890 784	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Headquarters, Air Training Command U. S. Air Force
13. ABSTRACT		
A visual inspection of all the pavements in March 1969 showed them to be in very good condition. Some minor cracking and joint opening were noted in the older pavement. Selected values from field tests performed in March 1969 are shown in table 2.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Hirsch Auxiliary Field, Laredo, Texas]		

DD FORM 1473 1 NOV 65

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
AIRFIELD PAVEMENT EVALUATION REPORT, LAREDO AIR FORCE BASE, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros William B. Fenwick		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1969	16	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-44	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 890 783	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Headquarters, Air Training Command U. S. Air Force
13. ABSTRACT		
<p>The controlling evaluation for the runway is based upon the runway interior. Maximum allowable loadings shown in the tabulation on page 1 are for capacity operations of aircraft during normal periods. A visual inspection of the pavement in March 1969 indicated the pavements to be in generally good condition. A few severe cracks were observed in the 11-in. portland cement concrete (PCC) on the north end of the outside runway. The cause of the cracks was not apparent, but they appear to be structural. The cracks are beginning to spall and create a debris problem.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Laredo Air Force Base, Texas]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION REPORT, KEESLER AIR FORCE BASE, BILOXI, MISSISSIPPI		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph Jim W. Hall		
6. REPORT DATE September 1969	7a. TOTAL NO. OF PAGES 4	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-45	
8. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 890 785	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Headquarters, Air Training Command U. S. Air Force
13. ABSTRACT The general condition of the KAFB pavements is good. The flexible pavements present a uniform and smooth appearance with no evidence of cracking. Hairline cracks were reportedly apparent in these pavements prior to the recent seal coat application. Parking aprons 1 and 2 are in fair condition with many slabs showing major transverse cracking, especially near the longitudinal drain along the center of these aprons. Parking apron 3 is in good condition with very few cracked slabs.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Keesler Air Force Base, Biloxi, Miss.]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, SIMMONS ARMY AIRFIELD, FT. BRAGG, NORTH CAROLINA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros William B. Abbott, Jr.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1969	4	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO. Q6-1	Miscellaneous Paper S-69-47	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 860 556	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING/MONITORING ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
The purpose of this report is to present the results of an inspection at Simmons Army Airfield (SAAF) in February 1969. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Simmons Army Airfield, Ft. Bragg, N. C.]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF GOODYEAR ALL-BONDED ALUMINUM HONEYCOMB LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Charles T. McCormick Gordon L. Carr		
6. REPORT DATE December 1969	7a. TOTAL NO. OF PAGES 48	7b. NO. OF REFS 4
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-49	
b. PROJECT NO. 1T062103A046		
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers list may be assigned this report) AD 865 408	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation conducted at the U. S. Army Engineer Waterways Experiment Station (WES) to evaluate an all-bonded aluminum honeycomb core landing mat designed and fabricated by Goodyear Aerospace Corporation, Akron, Ohio. The mat is a sandwich-type structure with the core bonded top and bottom to aluminum skins with an epoxy film adhesive. Extruded aluminum edge connectors are also bonded to the top and bottom skins and to the core. This investigation consisted of engineering traffic tests to obtain information to (a) determine the feasibility of fabrication of mat without welds, and (b) evaluate the service life and performance of the experimental mat. Laboratory tests were performed to provide data on the structural properties of the Goodyear mats and their component parts and results indicate the mats met the specification requirements. The mat was placed on a test section with a heavy clay subgrade (rated CBR of 3.4) and traffic tested with a single-wheel load of 25,000 lb and a tire inflation pressure of 250 psi. Results of this investigation revealed that the Goodyear 4 by 4-ft, all-bonded mat would sustain only 36 coverages of traffic on a 4.0-CBR subgrade. At the request of Goodyear personnel, 50 unused panels were returned to Goodyear for modifications. These modifications consisted of (a) welding the corners of the extruded edge connectors to provide additional strength in these areas, and (b) sawing the top of the female connector on each end to produce an angle between 15 and 20 deg to prevent end curl of the female lip. After these modifications had been made, the panels were shipped to WES where they were traffic tested. The modified panels sustained 500 coverages of traffic on a 4.3-CBR subgrade plus 90 coverages on a 4.0-CBR subgrade, which, combined, is equivalent to 466 coverages on a 4.0-CBR subgrade. Results indicate that fabrication of an all-bonded aluminum honeycomb core mat is feasible. However, improvement in fabrication techniques, especially to ensure additional strength at corners, is needed to provide a mat that will meet traffic requirements.		
KEYWORDS: Aluminum landing mats; Honeycomb structures; Traffic tests; [Goodyear aluminum mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
RECONSTRUCTION OF LANDING-MAT TEST FACILITY AND ITS PERFORMANCE DURING C-141A FLIGHT TEST PROGRAM, DYESS AIR FORCE BASE, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns Robert W. Grau		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1969	102	0
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-69-50	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 863 821L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; July 1971. Other requests for this document must be referred to Office, Chief of Engineers, HQDA (DAEN-MCE-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This investigation was conducted to evaluate techniques and materials used in the reconstruction of a landing-mat test facility and to observe the behavior of the landing-mat runway during C-141A operations. The test facility consists of a runway, 6000 ft long and 96 ft wide; a taxiway, 1252 ft long and 60 ft wide connecting with the main Dyess runway; and a turnaround taxiway loop at both ends of the runway. Three types of landing mat (MX19, AM2, and MX18) were used to surface the subgrade. Various types of waterproofing and dustproofing materials were applied to the subgrade, shoulders, and overruns. Based on the results obtained, conclusions were drawn as follows. Aluminum landing mat and ancillary items can be removed from a deteriorated airfield at a reasonable rate and with minimum damage if care is taken. The removal rates for the MX19, AM2, and MX18 planks were 330, 380, and 384 sq ft per man-hour, respectively. Approximately one percent of each type mat and of the 2-ft locking bars removed from the test facility were damaged beyond repair. About 5 percent of the 4-ft locking bars, 4-ft adapters, H-rails, and anchors were damaged and could not be reused. Although 50 percent of the key locks were damaged beyond repair, the number could have been reduced by more careful removal. Inspection of the membrane used in the original construction showed that only the Type 1 Herculite membrane was effective in waterproofing the subgrade and could have been reused as a waterproofing material. The subgrade can be waterproofed and will drain adequately if it is constructed at a 2.5 percent crown and surfaced with a polypropylene-asphalt membrane. The portions of the subgrade and the soil mattress section that were overlaid with T16 membrane remained waterproof.		
KEYWORDS: Aluminum landing mats; Dust control; Materials; Waterproofing; [Dyess Air Force Base, Abilene, Texas; MX18, MX19 and AM2 landing mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF DOW CHEMICAL EXTRUDED ALUMINUM LANDING MAT (XM18E1)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Dewey W. White Charles J. Gerard		
6. REPORT DATE December 1969	7a. TOTAL NO. OF PAGES 48	7b. NO. OF REFS 5
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-69-51	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 865 599	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes tests of an extruded aluminum landing mat designated XM18E1, which was produced under contract DACA39-67-C-0063(NEG). This mat, which was designed and developed by the Dow Chemical Company, is a one-piece extrusion fabricated from 6061 T6 aluminum. The mat panels are interlocked along the sides by a hinge-type connector. Extruded end connectors consisting of overlap and underlap sections are welded to the panel extrusion. A locking bar secures these sections after individual panels have been joined together. The mat panels described herein were different from modified MX18-B (which is type-classified as XM18) panels in that the insert tubes in the ends of the panels were shortened by 3/4 in. and the amount of metal was increased in the area of the female connector and first cavity adjacent to this connector. The method of attaching the end connectors to the mat extrusions was changed to allow improved corner welds. Two quantities of XM18E1 mat (engineer design test and production test quantities, with the latter taken after approximately 400,000 sq ft of mat had been produced under the contract mentioned above) were traffic tested with a 25,000-lb, single-wheel load (250-psi tire inflation pressure) simulating actual aircraft operations. These tests were conducted to determine the service life, to compare the performance of the mat with that of the modified MX18-B, and to determine if there were differences between the engineer design test and production test mats. The mats were tested on subgrades with rated CBR's of 4.0 and 3.7 for the engineer design test and production test mats, respectively. The engineer design test mat sustained 1100 coverages, and the production test mat sustained 452 coverages (equivalent to 620 coverages on a 4-CBR subgrade). The engineer design test XM18E1 performed 39 percent better than the modified MX18-B mat (670 coverages on a 4-CBR subgrade). The reduction in service life of the production test mat was attributed to inconsistency in the dimensions of the physical members (although they were within tolerance) and the use of a brittle welding wire in the corner welds. KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [Dow landing mats; XM18E1 landing mat]		

DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
PAVEMENT TESTS TO PROVIDE FOR THE JUMBO JETS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Richard G. Ahlvin		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1969	17	6
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO.	Miscellaneous Paper S-69-52	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 735 781	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
Paper for presentation at the Seventh Pavin Conference, University of New Mexico, 11-12 December 1969		
13. ABSTRACT		
<p>With the advent of jumbo-jet aircraft, as represented by the Lockheed C-5A Galaxy and the Boeing 747, we are faced with supporting three-quarter million pound and larger aircraft on pavement facilities. To provide information on pavement behavior, test sections of both flexible and rigid pavement have been constructed and are being tested to failure under the full prototype loading of one 12-wheel main landing gear of the C-5A aircraft. The testing program is a joint effort of the Army, Air Force, and Federal Aviation Administration and is being conducted at the U. S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi. Each of the test sections incorporates items of different thicknesses planned to fail at various load repetition levels. The test subgrade was constructed to a carefully controlled strength to a full 12-ft depth. Both test sections incorporate stress, strain, and deflection measuring instruments at various depths within the structure. These instruments have been loaded not only with the full 12-wheel C-5A gear but with single-wheel gear and components of the C-5A and 747 gear at various loadings.</p>		
KEYWORDS: Flexible pavement design (Airfields); Jet aircraft		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF HARVEY NEW-PROFILE AM2 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Victor C. Barber Robert W. Grau		
6. REPORT DATE February 1970	7a. TOTAL NO. OF PAGES 74	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-4	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (In: oth. numbers that may be assigned this report)	
d.	AD A032 965	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT This investigation was conducted to evaluate new-profile AM2 landing mat by Harvey Aluminum Company, Torrance, Calif. Three methods were used to attach end connectors to the main extrusion to form either 2- by 12-ft or 2- by 6-ft planks. These methods were electron beam welded with insert (EBI), electron beam welded without inserts (EB), and metal-inert-gas fusion welded without inserts (MIG). Two test sections were constructed and surfaced with new-profile mat. Items 1 and 2, test section 1, were surfaced with EBI and EB mat, respectively. Both items in test section 2 were surfaced with the MIG welded mat. Each test section was subjected to uniform-coverage traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb with a 30x7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that EBI and EB mats will sustain 1600 cycles of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 2.6 or greater throughout the period of traffic, or between 700 to 1000 coverages of the same loading when placed on a subgrade having a CBR of 4. These mats meet the service life criterion as required by NAEC. MIG welded mat will sustain 1600 cycles of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 3.6 or greater throughout the period of traffic or 250-300 coverages of the same loading when placed on a subgrade having a CBR of 4. This mat also meets the minimum service life criterion established by NAEC. KEYWORDS: Aluminum landing mats; Traffic tests; [AM2 landing mat; Harvey Aluminum, Inc.]		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF MODIFICATIONS OF AM2 AND XM18 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Denis P. Wolf		
6. REPORT DATE February 1970	7a. TOTAL NO. OF PAGES 52	7b. NO. OF REFS 3
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-5	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 757 383	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT This investigation was conducted to evaluate the performance of Alcoa AM2 and electron beam welded XM18 landing mat. The test section was subjected to traffic representing 1600 operational cycles of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb and a 30x7.7 tire inflated to 400 psi. Based on the results obtained in this investigation, it is concluded that Alcoa AM2 landing mat will sustain 1600 cycles of uniformly distributed aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of approximately 6 or greater. This does not meet current minimum requirements for SATS set by NAEC. Electron beam welded XM18 landing mat will sustain 1600 cycles of uniformly distributed aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 4.3 or greater. This performance is marginal with respect to compliance with current minimum requirements. KEYWORDS: Aluminum landing mats; Traffic tests; [Alcoa; AM2 landing mat; XM18 landing mat]		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF XM20 PRODUCTION LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns Robert W. Grau		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1970	39	2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Report S-70-6	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 757 385	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Naval Air Engineering Center Philadelphia, Pa.
13. ABSTRACT		
<p>This investigation was conducted to evaluate the performance of a production quantity of XM20 landing mat extruded by Dow Chemical Company, Madison Division, Madison, Ill., and fabricated by Washington Aluminum Company, Enterprise, Ala. The mat, fabricated from 2- by 12-ft extrusions, was similar to AM2 mat except for the method used to attach the end connectors to the main extrusion and a slight change of the cross section of the main extrusion. A test section consisting of one clay subgrade item at a strength of 4 CBR was constructed and surfaced with XM20 mat. The test section was subjected to uniform-coverage traffic representing operations of an aircraft having a 60,000-lb gross weight with a single-wheel main-gear assembly load of 27,000 lb with a 30x7.7 tire inflated to 400 psi. Based on the results obtained in this study, it is concluded that the XM20 mat will sustain 1600 cycles of aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 2.8 or greater throughout the period of traffic, or about 685 coverages of the same loading when placed on a subgrade having a CBR of 4 or greater throughout the period of traffic. This mat meets the criteria established by NAEC for landing mats considered for use in SATS. The double thickness of the ribs provided by inserts at the end joints of the planks has virtually eliminated end-joint weld failures. For practical purposes, there was no significant difference in the performance of the XM20 production mat and that of the experimental mat.</p> <p>KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [AM20 landing mat; Dow Chemical Co.; Washington Aluminum Co.]</p>		

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Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE M8A1 STEEL LANDING MAT COMPARISON TESTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Dewey W. White, Jr. Dave A. Ellison		
6. REPORT DATE March 1970	7a. TOTAL NO. OF PAGES 62	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-9	
8. PROJECT NO. IT062103A046, Task 05		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 866 224L	
d.		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; November 1971. Other requests for this document must be referred to U. S. Army Materiel Command.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation conducted to evaluate M8A1 steel landing mat with short cover-plate welds and less than the minimum required thickness of metal in the bends of the ribs and to compare these mats with T10 and M8 mats. Traffic tests were conducted on a prepared test section, with a rolling wheel load simulating actual aircraft operations. Based on the data obtained from this investigation, it is concluded that: M8 mat will withstand only 19 percent as many coverages as the T10 control mat when trafficked with a 35,000-lb single-wheel load on a 3-CBR subgrade; M8A1 with short cover-plate welds will withstand only 44 percent as many coverages as T10 control mat when trafficked with a 35,000-lb single-wheel load on a 3-CBR subgrade; M8A1 short-weld mat will sustain about 64 percent of the traffic sustained by the T10 control mat when placed on a 6-CBR subgrade and trafficked with a 35,000-lb single-wheel load; M8A1 thin-rib mat with metal thickness below the allowable thickness in the bends of the ribs will withstand only 63 percent as many coverages as the T10 control mat when trafficked with a 35,000-lb single-wheel load on a 3-CBR subgrade; there are no apparent differences in the performance of the thin-rib M8A1 mat and that of T10 mat when trafficked on a 5.8-CBR subgrade; reducing the specified thickness of metal in the bend radii of mat ribs by approximately 10 to 15 percent is less severe than reducing the length of the cover-plate welds by the same amount. It is recommended that necessary quality control measures be maintained to ensure better quality cover-plate welds in the fabrication of M8A1 mats and that mat not be accepted if the cover-plate welds do not extend the prescribed length or if the metal thickness in the bends of the ribs is less than the thickness allowable. KEYWORDS: Steel landing mats; Traffic tests; [M8A1 landing mat]		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
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Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
PAVEMENT FAILURE REPORT, RAMEY AIR FORCE BASE, PUERTO RICO			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Alfred H. Joseph William B. Abbott, Jr.			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1970		14	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-70-10	
c. Obligation Document S-70-25		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 967	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Headquarters, Strategic Air Command U. S. Air Force	
13. ABSTRACT			
<p>Visual observations were made of the pavement and any signs of cracking or distress were noted. Field test pits were located to provide information on layer thickness, water content, density, and strength characteristics representative of the underlying base and subgrade. Laboratory tests were run to classify base and subgrade materials. Field testing was conducted at eight test pits. Testing consisted of in-place CBR, water content, and density measurements at the surface of the base course, approximately 8 in. below the base surface, and at the surface of the subgrade.</p>			
KEYWORDS: Flexible pavement failures (Airfields); [Ramey Air Force Base, Puerto Rico]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE INVESTIGATION OF A PROPRIETARY CHEMICAL AGENT FOR SOIL STABILIZATION		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) George R. Kozan John D. Stouffer		
6. REPORT DATE April 1970	7a. TOTAL NO. OF PAGES 57	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-11	
b. PROJECT NO. 1T021701A046		
c. Task 05	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 873 019L	
d.		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; August 1973. Other requests for this document must be referred to U. S. Army Materiel Command, Washington, D. C.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT A need exists for soil treatment materials capable of improving soils by providing strength, by waterproofing, and by alleviating dust in support of military road and airfield operations. Field and laboratory investigations were conducted on a proprietary material (product A) to determine its potential for use as a soil stabilizer for military purposes and its effectiveness in pretreating soil to improve penetration of dust-control materials, e.g. asphaltic penetrative soil binder (APSB). Two test sections, one untreated and one treated with product A, were constructed in an open area and trafficked with a military vehicle and a test load cart. Measurements and observations made during construction and traffic testing showed no significant difference between the treated and untreated sections with respect to strength and ability to support traffic under either wet or dry conditions. For the penetration tests, an open area was bladed to remove all vegetation. Half of this bladed area was pretreated with product A, and then APSB was applied; the other half of the area received only an application of the APSB. Test results indicated that the depth of penetration of the APSB was not affected appreciably by pretreatment of the soil surface with product A. Laboratory tests on representative soil samples obtained from the field test sections indicated no significant alteration of water content or Atterberg limits and only a minor decrease in pH values for treated areas. It was concluded that product A has no potential for military soil stabilization purposes, and it is recommended that no further tests of this material be conducted. KEYWORDS: Chemical soil stabilization; Dust control; Materials; Military roads; Waterproofing		

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Unclassified
Security Classification

Unclassified
Security Classification

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DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Cite as author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF SOIL STRENGTH OF UNSURFACED FORWARD-AREA AIRFIELDS BY USE OF GROUNDED VEHICLES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
George M. Hammitt II		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1970	41	8
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-70-14	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 709 589	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>This report describes a method for rapidly determining the soil strength at forward-area airfields. Through the use of dimensionless ground mobility parameters developed by the U. S. Army Engineer Waterways Experiment Station, soil strength indications are determined by measuring rut depths created by traffic of standard military ground vehicles. This method enables reasonably accurate assessment of soil strength by personnel without special training and without the use of special instruments. If the soil strength existing in the forward areas is known, predictions can be made concerning the ability of a particular site to sustain specific aircraft traffic. Initially, an office study was conducted that established the potential of such a method. Then limited field verification tests were conducted with four standard military ground vehicles, i.e. a 1/4-ton M51, a 3/4-ton M37, a 2-1/2-ton M35A1, and a 5-ton M55, operated on a prepared unsurfaced heavy clay subgrade with a strength of approximately 2 CBR. First-pass rut depths were measured for each vehicle operated empty and for all but the M55 with maximum cross-country loading. The results of this testing indicated the feasibility of predicting soil strength based on one-pass rut depth caused by military ground vehicles. This method can be used to predict the ability of a particular forward-area airfield to sustain specific small aircraft traffic. It is recommended that further studies include operations of aircraft from actual landing sites on both clay and sand.</p>		
KEYWORDS: Military vehicles; Mobility; Soil strength; Unsurfaced airfields		

DD FORM 1473
1 NOV 68

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE RESTORATION OF LANDING-MAT-SURFACED SUBGRADES BY GROUTING METHODS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Victor C. Barber		
6. REPORT DATE June 1970	7a. TOTAL NO. OF PAGES 76	7b. NO. OF REFS None
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-19	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.	AD 710 962	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT Engineering tests were conducted at the U. S. Army Engineer Waterways Experiment Station in order to evaluate the use of portland cement and asphaltic materials as grout for the repair of pumped subgrades under heavy-duty airfield landing mats and to develop equipment and criteria for their application. By using portland cement grouts, it was often possible to restore the landing mats to the original crown configuration, and the effective life of the test section could be increased, though cement grouts failed to waterproof the subgrade. Though asphalts tested could moderately extend the effective life of the test section when they completely covered the area and prevented additional wetting of the subgrade, they could not raise the landing mat to its original crown configuration. The softening point of the asphalts tested proved too low for the asphalts to be stable under landing mats when temperatures reached 100 F in the sun and landing mat temperatures reached 150 F. It was concluded that portland cement grouting could be used as a repair technique when the subgrade damage was confined to a relatively small portion of the mat-covered area where expenditures of materials and man-hours would not be exorbitant, and that 40-50 and 60-70 penetration asphalt cements were not adequate for use as grouting materials. KEYWORDS: Asphalts; Grouts; Landing mat recovery and reuse; Portland cements; Pumping of pavements; Subgrades		

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Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE EVALUATION OF KAISER XM19 ALL-BONDED ALUMINUM HONEYCOMB LANDING MAT		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Hugh L. Green Carroll J. Smith		
6. REPORT DATE July 1970	7a. TOTAL NO. OF PAGES 59	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-21	
b. PROJECT NO. 1G664717D556	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c. Task 01	AD 875 981	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT The investigation reported herein was conducted to evaluate an all-bonded version of the XM19-type landing mat. The mat, which was designed and developed by Kaiser Aluminum and Chemical Sales Company, Inc., Oakland, Calif., is a sandwich-type structure composed of an aluminum honeycomb core bonded by film adhesives on top and bottom to aluminum facings. The design of the mat is similar to that of the standard XM19 mat, except instead of being welded during fabrication, the extruded edge connectors are bonded to both the facing and the core. Individual panels are joined along two edges by a hinge-type connection and along the adjacent two edges by overlap-underlap connections that are locked together by insertion of a connector bar. This investigation consisted of laboratory and traffic tests to obtain information for use in comparing the performance of the Kaiser bonded mat with project requirements and with the performance of standard XM19 mat. The traffic tests were conducted on a prepared subgrade, with a rolling wheel load simulating actual aircraft operations. The tests were conducted with a single-wheel load of 25,000 lb with a tire inflation pressure of 250 psi on a mat-surfaced subgrade with an initial CBR of 3.9. Results of this investigation revealed that the all-bonded XM19-type mat sustained 3380 actual coverages of traffic on a subgrade that had rated CBR strengths ranging from 3.4 to 4.0. These coverages, when equated to an equivalent 4-CBR subgrade, would total 4840 coverages, thus greatly exceeding the project requirement of 1000 coverages and surpassing the performance of the standard XM19 mat. Eventual failure of individual panels was not sudden and was caused by a gradual depression of the surface of the panels due to core failure. It is recommended that the all-bonded method of fabrication be considered for the XM19 mat in lieu of the present method of welding KEYWORDS: Aluminum landing mats; Honeycomb structure; Traffic tests; [Kaiser landing mats; XM19 landing mat]		

DD FORM 1473

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Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
TECHNIQUES FOR OVERLAYING DETERIORATED LANDING MAT; Bare Base Support		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Cecil D. Burns William N. Brabston		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1970	74	4
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 3782-63	Miscellaneous Paper S-70-23	
c.	8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 756 197	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Air Force
13. ABSTRACT		
<p>Two mat overlay test sections were constructed and subjected to simulated aircraft traffic. Both test sections consisted of a compacted soil and AM2 mat overlay on rough deteriorated M6 mat. In the first test section, four types of soil cushions were evaluated: a thin sand layer, a 4-in.-thick sand layer, a 4-in.-thick clay gravel layer, and a 4-in.-thick, membrane-covered lean clay layer. The test section was subjected to simulated F-4C traffic. Best performance was obtained with the lean clay cushion. The second test section had a 4-in.-thick lean clay soil cushion surfaced with new AM2 over deteriorated M6. The test section had a 2-1/2 percent crown, and eight different placement configurations were used to determine the optimum pattern for placing 2- by 12-ft mat on a crowned subgrade. The test section was subjected to simulated F-4C and C-130 test traffic. Best performance was obtained with a configuration having a 1-ft staggered longitudinal end-joint pattern with only half panels at the center line of the test section. Overall findings from this and another Bare Base mat overlay investigation indicate that the basic soil-landing mat overlay technique is feasible. Practically any type of soil can be used, but the soil cushion must be well protected from surface water. Sands and fine-grained soils can be protected with pre-fabricated membrane. Gravelly soils must be chemically stabilized. Generally, the minimum thickness that will provide a smooth bearing surface for the overlay mat is considered optimum. Greater thickness may be used except with sand, which will exhibit considerable densification and cause subsequent high mat deflection.</p>		
KEYWORDS: Bare base support; Landing mats; Overlays (Landing mats); [AM2 landing mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing notation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE SOIL STRENGTH CRITERIA FOR OPERATION OF FIGHTER AIRCRAFT ON UNSURFACED AIRFIELDS; Bare Base Support		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Donald M. Ladd		
6. REPORT DATE September 1970	7a. TOTAL NO. OF PAGES 62	7b. NO. OF REFS 13
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-24	
b. PROJECT NO. 3782-65		
c.	9b. OTHER REPORT NO.(s) (Any other numbers that may be assigned this report)	
d.	AD 756 158	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Air Force
13. ABSTRACT The purpose of this study was to obtain necessary data to validate or modify, if necessary, existing soil strength criteria for the operation of high-performance jet fighter aircraft on unsurfaced airfields. Two specially prepared test sections were constructed with four test items in each section. Test section 1 consisted of two lean clay test items and two heavy clay test items. Test section 2 consisted of four items: clayey sand, lean clay, silt, and heavy clay. These test sections were trafficked with an F-4C-type loading, and the results were used to obtain criteria for operation of fighter-type aircraft on unsurfaced soils. Skid tests were also conducted on these test sections to simulate the effects of braking on unsurfaced soils. Results of the traffic tests indicated that existing criteria are adequate for use in designing unsurfaced airfields for the rolling loads of fighter aircraft. Analysis of the skid test data indicates that unsurfaced airfields constructed of soils with strength that is primarily dependent on the angle of internal friction may not be adequate to withstand maximum braking loads of fighter aircraft.		
KEYWORDS: Bare base support; Fighter aircraft; Soil strength; Unsurfaced airfields		

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Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF ALCOA BRAZED AM5 LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Denis P. Wolf		
6. REPORT DATE November 1970	7a. TOTAL NO. OF PAGES 31	7b. NO. OF REFS 3
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-70-26	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 757 384	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Naval Air Engineering Center Philadelphia, Pennsylvania
13. ABSTRACT The investigation reported herein was conducted to evaluate the performance of Alcoa Lightweight Brazed AM5 landing mat, fabricated by the Aluminum Company of America, New Kensington, Pa. Fabrication included a new process called "flip-flop brazing" by the manufacturer. A test section, consisting of a heavy clay subgrade, was constructed and surfaced with the Alcoa AM5 landing mat. The test section was subjected to traffic representing 1600 operational cycles (188 coverages) of an aircraft having a 60,000-lb gross weight with a single-wheel main gear assembly load of 27,000 lb and a 30x7.7 tire inflated to 400 psi, which represented the minimum service life requirement. Traffic was continued until the section was considered failed after 286 coverages. Based on the results obtained in this investigation, it is concluded that the Alcoa AM5 will sustain 1600 cycles (188 coverages) of uniformly distributed aircraft operations with a 27,000-lb single-wheel load and 400-psi tire inflation pressure when placed on a subgrade having a CBR of 3.3 or greater. This performance exceeds the current minimum requirements for SATS set by NAEC. The flip-flop brazing process resulted in considerable improvement in the performance of the AM5 mat over the performance of Alcoa AM2 mat previously tested at WES. KEYWORDS: Aluminum landing mats; Traffic tests; [Alcoa; AM5 landing mats]		

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Security Classification

Unclassified Security Classification		
DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing notation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
DUST CONTROL BY THERMAL METHODS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Bobby D. Ainsworth Katharine Mather		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1970	16	9
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 1V021701A046		Miscellaneous Paper S-70-27
c. Task 03		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD 878 791
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>Two natural gas burners were used as heat sources in attempts to stabilize samples of three soils in several moisture conditions. Although small areas of soil surface could be fused, the 4- by 4-ft test samples were not stabilized. Thermal stabilization appears to be impractical for soil stabilization with available burners.</p>		
KEYWORDS: Dust control; Thermal soil stabilization		

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1 NOV 66
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Unclassified
Security Classification

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
US Army Engineer Waterways Experiment Station Vicksburg, Mississippi 39181		UNCLASSIFIED
		2b. GROUP
3. REPORT TITLE		
DEVELOPMENT OF LANDING MAT GROUND FLOTATION EVALUATION CRITERIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
January 1969-March 1970		
5. AUTHOR(S) (First name, middle initial, last name)		
D. M. Ladd		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1970	80	2
8a. CONTRACT OR GRANT NO. MIPR 68-25		9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 476L		Miscellaneous Paper S-70-30 AFWL-TR-70-79
c. Task 03		9b. OTHER REPORT NUMBER(S) (Any other numbers that may be assigned this report)
d.		AD 878 066L
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; September 1970. Other requests for this document must be referred to Air Force Weapons Laboratory (DEX), Kirtland Air Force Base, New Mexico.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Air Force Weapons Laboratory Air Force Systems Command Kirtland Air Force Base, New Mexico
13. ABSTRACT		
<p>General criteria for the design and evaluation of airfields surfaced with medium-duty landing mat are presented. Specific criteria are presented for medium-duty mat subjected to operation of the C-141 aircraft. These criteria were developed using a new method of analysis involving the four primary parameters of CBR, load, tire pressure, and coverages.</p>		
KEYWORDS: Landing mat design; Medium-duty landing mats; [C-141 aircraft]		

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Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		20. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE AIRFIELD PAVEMENT EVALUATION REPORT, GODMAN ARMY AIRFIELD, FORT KNOX, KENTUCKY		20. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph Philip J. Vedros Ralph D. Jackson			
6. REPORT DATE January 1971	7a. TOTAL NO. OF PAGES 8	7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-1		
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
c.	AD A006 517		
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Engineer District, Baltimore Baltimore, Maryland	
13. ABSTRACT The primary purpose of this study was to establish the allowable load-carrying capacities of the airfield pavements at Godman Army Airfield (GAA), Fort Knox, Kentucky, and to determine overlay requirements for C-130 aircraft operations. Godman Army Airfield is located in that portion of the Fort Knox military reservation which lies in Hardin County, Kentucky, approximately 6 miles south of West Point, Kentucky, and is adjacent to U. S. Highway 31W.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Godman Army Airfield, Fort Knox, Kentucky]			

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Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
THICKNESS REQUIREMENTS FOR SOILS BENEATH LANDING MATS, Bare Base Support		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Harry H. Ulery, Jr. Denis P. Wolf		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
January 1971	125	5
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
A. PROJECT NO. 3782-64	Miscellaneous Paper S-71-3	
C.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.	AD 756 198	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Air Force Washington, D. C.
13. ABSTRACT The study reported herein is one phase of the research program being conducted at the U. S. Army Engineer Waterways Experiment Station for the purpose of developing a method for determining thickness requirements for landing-mat-surfaced, membrane-surfaced, and unsurfaced airfields. The phase of the program presented in this report pertains to the development of a method for determining thickness requirements of soil strengthening layers for landing-mat-surfaced airfields. Five landing-mat-surfaced test sections were constructed and tested. The subgrades of the test sections consisted of heavy clay (1.3 to 3.7 CBR) of various thicknesses. The same material placed at a higher strength (3.0 to 6.0 CBR) was used as a strengthening layer between the landing mat and subgrade. Test section I was surfaced with M3A1 landing mat; test sections II, III, and IV were surfaced with XM18 landing mat; and test section V was surfaced with AM2 mat. Aircraft traffic with single-wheel loads of 25,000 to 70,000 lb with tire pressures ranging from 112 to 229 psi and traffic with twin-wheel configurations spaced 32 in. center-to-center with loads ranging from 56,000 to 70,000 lb and tire pressures ranging from 109 to 182 psi were simulated by means of test load carts. Traffic was applied until each test section failed. CBR, water content, and density of the subgrade and overlying higher strength layer were measured before, during, and after the traffic tests, and the condition of the test sections was recorded. Deflections and deformations were determined throughout testing. An equation for determining the required thickness of soil strengthening layers beneath landing mat was developed.		
KEYWORDS: Airfields; Bare base support; Landing mats; Membranes; Soil thickness; Unsurfaced airfields		

DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
HISTORY OF KAISER ALUMINUM HONEYCOMB-CORE SANDWICH-TYPE MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Gordon L. Carr		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1971	54	7
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-71-4	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 908 324L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; 6 March 1973. Other requests for this publication must be referred to U. S. Army Materiel Command, Washington, D. C.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>This report gives the history of the development and improvements of aluminum honeycomb-core sandwich-type landing mats which were tested as medium-duty mats. These mats were designed, developed, and fabricated by the Kaiser Aluminum and Chemical Sales Co., Inc., Oakland, Calif. During the period January 1965-May 1968, accelerated traffic tests were conducted on several experimental versions of the mats at the U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss. A small quantity of the last version (designated XM19-C) was acquired from a 9,000,000 sq ft production contract and tested at the WES. Integrated engineering/service tests were conducted at Dyess AFB, Texas, on the MX19 (first production) mat. This report describes the metamorphosis of the prototype MX19 to the present XM19 which has been type classified (limited production) in the Federal Supply System.</p>		
<p>KEYWORDS: Accelerated traffic tests; Aluminum landing mats; Honeycomb structures; Medium-duty landing mats; [Kaiser Aluminum and Chemical Co.; XM19 landing mat]</p>		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
AIRFIELD PAVEMENT REQUIREMENTS FOR MULTIPLE-WHEEL HEAVY GEAR LOADS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Donald N. Brown John L. Rice			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
January 1971	43	3	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)		
FA69NAI-1561	Miscellaneous Paper S-71-5		
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
c. Work Unit No. 450-702-04E	FAA-RD-70-77; AD 721 530		
d.			
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Federal Aviation Administration Systems Research & Development Service Washington, D. C.	
13. ABSTRACT			
<p>This document presents recommended changes to Federal Aviation Administration (FAA) Advisory Circular No. 150/5320-6A, Airport Paving, relative to design and evaluation of airport pavements subject to traffic resulting from operation of the Boeing 747 and/or Lockheed C-5A aircraft. Criteria for flexible and rigid pavements were prepared in accordance with procedures developed as a result of an engineering investigation of the effects of traffic of multiple-wheel heavy gear loads.</p>			
<p>KEYWORDS: Flexible pavement design (Airfields); Multiple wheel landing gear; Rigid pavement design (Airfields)</p>			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF KAISER PRODUCTION ALUMINUM HONEYCOMB LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Charles T. McCormick		
6. REPORT DATE March 1971	7a. TOTAL NO. OF PAGES 65	7b. NO. OF REFS 5
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-7	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 883 189	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT The investigation reported herein was conducted to evaluate an aluminum honeycomb-core landing mat designed and fabricated by Kaiser Aluminum and Chemical Sales Company, Inc., Oakland, Calif. The mat is a sandwich-type structure with the core bonded by an epoxy film to aluminum skins on top and bottom. Extruded edge connectors are welded to the skins and bonded to the core. Individual panels are joined along two edges with a hinge-type connector and along the adjacent two edges by overlap/underlap-type connectors that are locked together by insertion of a connector bar. This investigation consisted of laboratory and traffic tests to obtain information to evaluate the performance of the Kaiser mat with regard to project requirements. The traffic tests were conducted with a rolling wheel load simulating actual aircraft operations on mat placed on a prepared subgrade. The tests were conducted with a single-wheel load of 25,000 lb with a tire inflation pressure of 250 psi on a mat-surfaced subgrade with a rated CBR of 4.1. Failures resulted from depression of the surface of the panels caused by core failure and by overstressing the potting compound between the edge connectors and honeycomb core. Results of this investigation revealed that the Kaiser production mat sustained 1434 coverages of traffic, which was equivalent to 1280 coverages on a 4-CBR subgrade, thus exceeding the project requirements (1000 coverages on a 4-CBR subgrade). Based on the results obtained in this investigation, it is recommended that overall quality control measures be employed to eliminate fabrication deficiencies that occur when panels are fabricated at a high production rate. KEYWORDS: Aluminum landing mats; Honeycomb structure; Traffic tests; [Kaiser landing mats]		

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Unclassified
Security Classification

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Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexes: notation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE EXTRACTION PROCEDURE FOR RUBBERIZED-TAR PAVING MIXTURES		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) October 1969 through December 1970			
5. AUTHOR(S) (First name, middle initial, last name) T. D. White			
6. REPORT DATE February 1971		7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. MIPR 70-2		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-8	
b. PROJECT NO. 683M		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AFWL-TR-70-132 AD 881 757	
c. Task 4			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Air Force Weapons Laboratory Air Force Systems Command Kirtland Air Force Base, New Mexico	
13. ABSTRACT An extraction method for rubberized tar was developed and validated. The basic procedure is a modification of Method A of the Standard Method of Test for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures, ASTM Designation D 2172. The modification involves use of a primary and a secondary solvent: a material derived from tar distillation called quinolin and 1,1,1-trichloroethane, respectively. Results of tests using the suggested method indicate that the method is valid for nonporous and porous aggregates over a wide range of rubberized-tar contents.			
KEYWORDS: Rubberized tar; Rubberized tar pavements			

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.</small>		
1. ORIGINATING AGENCY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, LIBBY ARMY AIRFIELD, FT. HUACHUCA, ARIZONA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1971	6	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. Q6-1	Miscellaneous Paper S-71-11	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 724 069	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
The purpose of this report is to present the results of an investigation performed at Libby Army Airfield (LAAP) in September 1970. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Libby Army Airfield, Fort Huachuca, Arizona]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) US Army Engineer Waterways Experiment Station (WES) Vicksburg, Mississippi 39180		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP
3. REPORT TITLE PAVEMENT DESIGN FOR VARIOUS LEVELS OF TRAFFIC VOLUME		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) January 1968-December 1970		
5. AUTHOR(S) (First name, middle initial, last name) David L. Cooksey Donald M. Ladd		
6. REPORT DATE March 1971	7a. TOTAL NO. OF PAGES 20	7b. NO. OF REFS 8
8a. CONTRACT OR GRANT NO. MIPR 68-10 Program Element 62301F 8. PROJECT NO. 5713 c. Task No. 5-1	8a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-14 8b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AFWL-TR-70-133 AD 882 234L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; March 1971. Other requests for this document must be referred to Air Force Weapons Laboratory (DEZ), Kirtland Air Force Base, New Mexico.		
11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY AFWL (DEZ) Kirtland AFB, NM 87117	
13. ABSTRACT <p>The design of a flexible pavement airfield requires that the traffic volume be considered as one of the parameters. Criteria are presented that allow the airfield designer to design an airfield for any anticipated traffic volume by decreasing the basic design thickness for less-than-capacity traffic and increasing the basic design thickness for traffic volumes greater-than-capacity operation.</p> <p>KEYWORDS: Flexible pavement design (Airfields); Traffic volume (Passes)</p>		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

UNCLASSIFIED
Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		29. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		25. GROUP
INVESTIGATION OF PAVEMENT SURFACE CRACKING, AMEDEE ARMY AIRFIELD, HERLONG, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7A. TOTAL NO. OF PAGES	7B. NO. OF REFS
May 1971	6	
8A. CONTRACT OR GRANT NO.	5A. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1971, Project Q6-1		
B. PROJECT NO. 4DM78012AQ61	Miscellaneous Paper S-71-15	
C. Task 08	5B. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
D.	AD 725 533	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>The purpose of this report is to present the results of an investigation conducted at Amedee Army Airfield (AAAF) in May and October 1970. An unusual problem occurred in the bituminous overlay pavement on the airfield, and this investigation was conducted to determine the cause of and possible remedies to this problem. The bituminous overlay was placed on the runway in the fall of 1969, and in the spring of 1970 dome-shaped up-heavals about 1 ft in diameter and up to 1-1/2 in. high with star-shaped cracks on top occurred in the runway surface. A number of these dome-shaped bulges were sawed out of the pavement, and tests were made on the materials. Results of these tests are reported herein.</p>		
KEYWORDS: Bitumens; Flexible pavement failures (Airfields); Overlays (Pavements); Pavement cracking; [Amedee Army Airfield, Herlong, Calif.]		

DD FORM 1 NOV 68 1-73

REPLACES DD FORM 1473, 1 JAN 68, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
DEFLECTION-COVERAGE RELATIONSHIP FOR FLEXIBLE PAVEMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (Last name, middle initial, first name)		
Alfred H. Joseph Jim W. Hall, Jr.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1971	29	17
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-71-18	
9. PROJECT NO.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 725 992	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>This study was conducted for the purpose of developing a relationship between elastic pavement deflection and pavement performance (number of traffic applications necessary to cause failure). Data for the study were taken from past studies of airfield and highway pavements. A summary of test conditions, failure criteria, and traffic type is given for each data source. A relationship was developed between elastic deflection and the number of coverages of traffic for combined airfield and highway data and for airfield data only. The relationship of wheel load and tire pressure is given, and a multiple-regression equation was determined to predict coverages as a function of wheel load, tire pressure, and deflection.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Flexible pavement performance and evaluation (Highways); Pavement deflection; Traffic tests		

DD FORM 1, NOV 66 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE INVESTIGATION OF FIBER GLASS REINFORCED RESINS FOR STABILIZATION OF MISSILE LAUNCHING SITES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Grady W. Leese		
6. REPORT DATE June 1971	7a. TOTAL NO. OF PAGES 47	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-19	
b. PROJECT NO. 17062103A046	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD A006 511	
c. Task 05		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Research and Development Directorate U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT Experience with Army tactical rockets and missiles has shown that during launchings over unprotected soil surfaces, the motor blast produces dust clouds that could reveal the firing location to the enemy and causes soil erosion in the launch area detrimental to reloading and operating conditions. As the tactical missiles and rockets are used as artillery and antiaircraft weapons in close support of forward-area ground operations, attenuation of dust clouds and control of ground erosion are considered essential for personnel and equipment protection and for camouflage and concealment. Tests using small rocket motors were made at the U. S. Army Engineer Waterways Experiment Station on blast-resistant materials and combinations of materials at exposure temperatures up to 3800 F to select the most favorable combination of materials for field testing. Field tests of materials were conducted with the Honest John and Little John rockets, both operational weapons, at the White Sands Missile Range, N. Mex. Based on results obtained in this investigation, the following conclusions are believed warranted: <u>a</u> . A ground cover constructed of high-heat-resistant polyester resin reinforced with glass will withstand the direct blast from the motor of the Little John rocket, and <u>b</u> . The use of a fence around two sides and along the rear edge of the firing pad will substantially reduce the areal extent of ground protection required for alleviating dust cloud formation during launch.		
KEYWORDS: Dust control; Erosion control; Fiber reinforced plastics; Jet blast resistant materials; Materials; Resins (Synthetic); Soil stabilization		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 69, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

UNCLASSIFIED Security Classification		
DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		20. REPORT SECURITY CLASSIFICATION
US Army Waterways Experiment Station Vicksburg, Mississippi 39181		UNCLASSIFIED
3. REPORT TITLE		20. GROUP
THEORETICAL LANDING MAT ANALYSIS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
February 1969-July 1971		
5. AUTHOR(S) (First name, middle initial, last name)		
T. D. White		
6. REPORT DATE	70. TOTAL NO. OF PAGES	70. NO. OF REFS
August 1971	70	19
80. CONTRACT OR GRANT NO.	80. ORIGINATOR'S REPORT NUMBER(S)	
MIPR 68-25	Miscellaneous Paper S-71-21	
8. PROJECT NO.	AFWL-TR-70-139	
476L		
9. Task No.	90. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
03	AD 887 547L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; August 1971. Other requests for this document must be referred to Air Force Weapons Laboratory (DEZ), Kirtland Air Force Base West, New Mexico.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		AFWL (DEZ) Kirtland AFB West, NM 87117
13. ABSTRACT		
<p>A theoretical analysis of prototype landing mat was made using five mathematical models. The model responses were compared for the same data. Several correlations of model response and prototype performance were made to study the application of the models for prediction of coverage life for landing mat. An equation that is independent of any of the models is presented that will predict reasonably well the coverage life of various landing mat prototype sections as well as unsurfaced landing areas.</p>		
KEYWORDS: Landing mat design; Mathematical models; Prototype tests		

DD FORM 1 NOV 65 1473

UNCLASSIFIED
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF FOAMED PLASTICS FOR USE AS STRUCTURAL SUPPORTING LAYERS IN PAVEMENTS AND FOUNDATIONS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph, Ralph D. Jackson, Thomas B. Rosser III		
6. REPORT DATE November 1971	7a. TOTAL NO. OF PAGES 80	7b. NO. OF REFS 13
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-24	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 733 874	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This project was generated by the need for criteria for using foamed plastic materials as structural elements of pavement structures or as foundation platforms where soil strength and aggregate supply are not conducive to conventional construction. The objective of the study was to develop engineering criteria for the performance of foamed and/or extended plastics, polyester resins, or other similar systems as structural layers. Tests were conducted on polystyrene with a density of approximately 4.0 pcf and a foamed-in-place polyurethane formulation with a nominal density of approximately 7 pcf. Various combinations of load, soil strength, tire pressure, and thickness were used in the study. Multiple statistical regression analyses were performed on the field data, and it was determined that a curvilinear equation gave the best correlation coefficients. Results of the study indicate that foamed plastics can be used as a structural layer in special cases where the soil will not support conventional construction equipment or when conventional methods of construction are too difficult or too expensive to be considered. Using the proper design and construction procedure, extended plastics can be used to support rolling and static loads on very low-strength soils.		
KEYWORDS: Foamed plastics; Pavements; Structural analysis		

DD FORM 1 NOV 61 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE DESIGN OF UNSURFACED SOIL FACILITIES FOR OPERATIONS OF C-5A AIRCRAFT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Donald M. Ladd Victor C. Barber		
6. REPORT DATE December 1971	7a. TOTAL NO. OF PAGES 50	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-71-27	
5. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 735 344	
c.		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT The purpose of the study reported herein was to obtain data to validate or modify, if necessary, existing criteria for the operation of the C-5A aircraft on unsurfaced airfields. Two specially prepared test sections were constructed and trafficked. Test section 1 consisted of a three-item test lane designed for evaluation of surface strength requirements and was trafficked with a 12-wheel C-5A gear arrangement loaded to 252,000 lb. Test section 2 consisted of two traffic lanes (lanes 1 and 2) of four items each designed for evaluation of thickness requirements. Lane 1 was trafficked with a 35,000-lb single-wheel load, and lane 2 was trafficked with the 12-wheel C-5A gear arrangement. An analysis of the test data showed that existing criteria could be used to design unsurfaced airfields for operations of C-5A aircraft.		
KEYWORDS: Airfield design; Soil strength; Traffic tests; Unsurfaced airfields; [C-5A aircraft]		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
EVALUATION OF DOW CHEMICAL COMPANY EXTRUDED ALUMINUM TWO-PIECE 2- BY 12-FT LANDING MAT (MX18-D)			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Dewey W. White, Jr.			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
December 1971	55	7	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1G664717DH01		Miscellaneous Paper S-71-28	
c. Task 10		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 735 345	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Army Materiel Command Washington, D.C.	
13. ABSTRACT			
<p>The investigation reported herein was conducted to evaluate an extruded aluminum alloy landing mat (designated MX18-D) designed and extruded by the Dow Chemical Company, Midland, Michigan. The mat, which was fabricated by Dow's subcontractor, Washington Aluminum Company, Enterprise, Ala., is a 2- by 12-ft. two-piece partially hollow 6061-T6 aluminum alloy panel. (Two 12-in.-wide extrusions are welded together along their longitudinal edges to form a 2-ft-wide panel.) The panels are interlocked along the sides by a hinge-type connector, the components of which are an integral part of the basic panel extrusion. Extruded aluminum edge connectors are welded to the basic panel and consist of an overlap and underlap section secured by a locking bar after individual panels have been joined together. This investigation consisted of engineering traffic tests to evaluate the design and performance of the Dow MX18-D mat for compliance with criteria specified in the Department of the Army approved Qualitative Material Requirement (QMR) for Prefabricated Airfield Surfacing dated 14 April 1966 (this QMR was subsequently revised, and the revised QMR was approved on 2 April 1968). The traffic tests were conducted with a rolling wheel load simulating actual aircraft operations on mat placed on a prepared subgrade. The tests were conducted with a single-wheel load of 25,000 lb with a tire inflation pressure of 250 psi on a mat-surfaced subgrade with a rated California Bearing Ratio (CBR) of 4.0 for both item 1 (mat oriented with internal ribs of extrusion perpendicular to the direction of traffic) and item 2 (mat oriented with internal ribs of extrusion parallel to the direction of traffic). Results of this investigation indicated that the Dow MX18-D mat on items 1 and 2 sustained 704 and 500 coverages, respectively, of traffic, thus exceeding the original project requirements of the 1966 QMR (200 coverages on a 4.0-CBR subgrade). The service life of the MX18-D mat placed with the internal ribs of the extrusion parallel to the direction of traffic was only 71 percent as long as the life of the mat placed with the internal ribs perpendicular to the direction of traffic. The longitudinal weld did not contribute significantly to mat failure. Laboratory tensile strength tests were conducted on samples taken from the top sheets, ribs, and bottom sheets of panels of MX18-D mat. Results of these tests revealed that the tensile strength was within the specified requirements. The revised QMR for expedient surfacings now specifies that a medium-duty mat must sustain 1000 coverages of a 25,000-lb single-wheel load on a 4.0-CBR subgrade and weigh no more than 4.5 lb per square foot of placing area. Since the MX18-D mat weighs 5.3 lb per square foot of placing area and did not sustain 1000 coverages, no further tests of this item are recommended.</p> <p>KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Laboratory tests; Traffic tests; [MX18-D landing mat, Dow Chemical Co.]</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
EVALUATION OF HARVEY ALUMINUM 1- BY 12-FT EXTRUDED ALUMINUM LIGHT-DUTY LANDING MAT WITH OVERLAP/UNDERLAP END CONNECTORS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Hugh L. Green Charles T. McCormick			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1971		64	7
9a. CONTRACT OR GRANT NO.		9b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1G664717DH01 Task 10		Miscellaneous Paper S-71-29	
c.		9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 735 783	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT			
<p>The investigation reported herein was conducted to evaluate an extruded aluminum alloy landing mat that was designed and fabricated by Harvey Aluminum Company, Inc., Torrance, Calif. The 1- by 12-ft mat is a one-piece hollow extrusion fabricated from 6063 aluminum alloy artificially aged to the T6 condition. The mat panels are interlocked along the sides by means of a hinge-type connector, the components of which are integral parts of the basic extrusion. End connectors, composed of extruded connectors welded to the basic panel and aluminum inserts using the electron beam (EB) welding method, consist of overlap and underlap sections that are secured by a locking bar after individual panels have been joined together. The investigation consisted of laboratory, traffic, and skid tests to obtain information for use in evaluating Harvey mat for potential use as a light-duty landing mat. Traffic tests were conducted with the mat placed on a prepared subgrade and trafficked with a rolling wheel load simulating actual aircraft operations. The tests were conducted using the C-130 aircraft loading, which consisted of a single-wheel load of 30,000 lb with a tire inflation pressure of 100 psi, on a subgrade with a rated CBR of 4.2. Results of this investigation revealed that the Harvey light-duty mat sustained 450 actual coverages of traffic on a subgrade with a rated CBR of 4.2, which is equivalent to 367 coverages on a 4-CBR subgrade. This falls short of the coverage criterion for light-duty mat, i.e. 1000 coverages on a 4-CBR subgrade. Failure of the panels occurred in the mat body with breakage in the top skins, bottom skins, and internal vertical members. No failures occurred at the end joints in the vicinity of the welds even though voids were present in the welds in some areas. The placement rate of the mat was 370 sq ft per man-hour. The average coefficients of friction obtained from skid tests on wet and dry surfaces were 0.60 and 0.73, respectively. The tire wear resulting from skidding on both the wet and dry surfaces was not considered significant. Laboratory tests conducted on the mat indicated that the 6063-T6 alloy exceeded the minimum physical requirements stipulated.</p>			
KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Laboratory tests; Light-duty landing mats; Traffic tests; [Harvey Aluminum Co., Inc.]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF KAISER XM19 WATERPROOF ALUMINUM HONEYCOMB LANDING MAT WITH D AND D1 CONNECTORS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Gordon L. Carr		
6. REPORT DATE February 1972	7a. TOTAL NO. OF PAGES 85	7b. NO. OF REFS 10
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-4	
b. PROJECT NO. 16664717D556		
c. Task 10	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 738 840	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This investigation was conducted to evaluate a waterproof version of XM19 landing mat, which is nearly identical with standard XM19 mat. Laboratory, blast, and traffic tests were conducted on three versions of the XM19 waterproof mat. The type 1 mat (D connector) permitted excessive deflection, including stresses and breaks in the panels. The type 2 mat (D1 connector without water seals) withstood a 25,000-lb, single-wheel load for 2000 coverages on a subgrade with a rated CBR of 4.1, which equates to 1785 coverages on a subgrade with a strength of 4 CBR. This exceeds the Qualitative Materiel Requirement (QMR) of 1000 coverages on a 4-CBR subgrade and is essentially equal to the service life of standard XM19 mat. The waterproofing capabilities of the type 3 mat (D1 connector with water seals) were demonstrated on low- and high-strength subgrades. Prior test data indicated that similar mat would not withstand 50 coverages in rainy weather, but the type 3 mat withstood 642 and 1668 coverages on subgrades of low and high strength, respectively, over a six-month period during which a total of 55.24 in. of rainfall (natural and simulated) was recorded. The placing rates for the types 1 and 2 mats were 414 and 441 sq ft per man-hour, respectively, on a flat subgrade. The maximum placing rate obtained for the type 3 mat in three tests was 66.4 sq ft per man-hour on a 2 percent crowned subgrade; however, this rate was increased considerably using improved placing tools. The antiskid coating provided a surface that yielded a coefficient of friction of 0.52 on both wet and dry surfaces and that produced only slight tire wear. The type 3 mat withstood the blast temperature test without loss of structural strength or damage to the seals. The seal bars were damaged both during traffic and during the removal operation and were not reusable. All locking bars were reusable except those damaged during removal. KEYWORDS: Aluminum landing mats; Honeycomb structures; Traffic tests; Waterproofing; [XM19 landing mats, Kaiser landing mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
EVALUATION OF MO-MAT 158 AS LIGHT-DUTY LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Carroll J. Smith		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1972	73	6
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-72-5	
b. PROJECT NO. 16664717DH01		
c. Task 10	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 738 137	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>This investigation was conducted to evaluate MO-MAT, a reinforced plastic material molded into a waffle-like configuration, for use as light-duty landing mat. Tests were conducted on four special panels of MO-MAT 158 connected by nut plates with bolts placed in predrilled holes. The traffic tests were conducted using C-130 aircraft loading on three prepared subgrades of different strengths. Results of this investigation indicated that MO-MAT 158 will sustain 96, 184, and 500 actual coverages of traffic when placed on subgrades with rated CBR's of 4.0, 6.5, and 10, respectively. Therefore, the MO-MAT 158 does not meet the Qualitative Materiel Requirement (QMR) for a light-duty mat (1000 coverages on a 4-CBR subgrade). The MO-MAT 158 panels were assembled at an average rate of 150 sq ft per man-hour, which does not meet the minimum QMR placing rate requirement of 400 sq ft per man-hour. The average coefficients of friction obtained from wet- and dry-skid tests were 0.30 and 0.45, respectively. Therefore, the coefficient of friction on a wet surface falls below the QMR coefficient of friction range of 0.4 to 0.8. Tire wear during the wet-skid tests was negligible, but small pieces of rubber were peeled from the tire during the dry-skid tests. The longitudinal and transverse joints did not provide waterproof connections; also, the longitudinal joint plastic nut plates were not strong enough to secure the bolted overlapping panels when the mat was placed on a 4-CBR subgrade. Due to hazards created when aircraft touch down short of a runway and due to possible difficulty during installation, the anchorage system used in this investigation is not considered feasible for field use. It is recommended that no further consideration be given to use of MO-MAT 158 as light-duty landing mat.</p> <p>KEYWORDS: Light duty landing mats; Plastic landing mats; Reinforced plastics; Traffic tests; MO-MAT 158 landing mat</p>		

DD FORM 1, NOV 61, 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
FEASIBILITY OF USING MEMBRANE-ENVELOPED SOIL LAYERS AS PAVEMENT ELEMENTS FOR MULTIPLE-WHEEL HEAVY GEAR LOADS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Cecil D. Burns William N. Drabston Robert W. Grau			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1972		61	6
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-72-6	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 738 839	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT			
<p>The investigation reported herein was conducted to (a) determine the feasibility of using membrane-enveloped soil layers (MESL) as structural elements in flexible pavements and (b) investigate the performance of MESL construction under multiple-wheel heavy gear load (MMHGL) traffic. A test section was constructed within the existing MMHGL test section at the U. S. Army Engineer Waterways Experiment Station utilizing the existing 4-CBR clay subgrade. The test section consisted of three test items. In item 1, the granular subbase and base and the asphaltic concrete used in the original construction were replaced with a 24-in.-thick MESL. In item 2, the granular subbase and base courses were replaced with a 21-in.-thick MESL that was overlaid with a 3-in.-thick layer of asphaltic concrete. In item 3, a 15-in.-thick MESL was used to replace the original granular subbase material. This item was then overlaid with a 6-in.-thick crushed-stone base and a 3-in.-thick asphaltic concrete surface course. The soil used for the MESL consisted of a lean clay (CL) and was compacted to a relatively high density at a water content slightly less than CE 55 optimum. The compacted soil was completely encased in a waterproof membrane. The subsurface membrane was a 6-mil-thick continuous sheet of clear polyethylene. The surface was formed in place utilizing polypropylene cloth that was field-treated with a cationic emulsified asphalt (ASTM designation C-RS-2). The test items were subjected to traffic with a simulated C-5A main-gear 12-wheel assembly with a 360,000-lb gross load and a 75,000-lb single-wheel assembly. The performance of the test items under traffic showed that the concept of utilizing MESL's as structural elements in pavement construction is feasible. The 24-in.-thick MESL constructed over a 4-CBR subgrade withstood more traffic with the C-5A loading than did a conventional pavement item of the same total thickness during the original MMHGL tests. Further work is needed to develop construction techniques and methods of constructing granular bases and asphaltic concrete layers over MESL's.</p> <p>KEYWORDS: Flexible pavement design (Airfields); Membrane enveloped soil layer; Multiple wheel landing gears; Subbases</p>			

DD FORM 1473
1 NOV 64

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

252

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE APPLICATION OF MODEL THEORY TO DESIGN AND EVALUATION OF AIRFIELD PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Yu T. Chou Owen O. Thompson		
6. REPORT DATE March 1972	7a. TOTAL NO. OF PAGES 75	7b. NO. OF REFS 62
8a. CONTRACT OR GRANT NO. 5. PROJECT NO. 4A062112A859 6. Task 02 d. Work Unit 001		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-7 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 741 368
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT Model-to-prototype similitude requirements were developed in this study for unsurfaced, landing-mat-surfaced, and conventional flexible and rigid pavement structures for airfields. An extensive literature search of model studies was first conducted. The general concept of dimensional analysis in the area of pavement systems was then introduced, followed by identification of important variables, development of pi terms, and formulation of similitude requirements for true and distorted models. A compensated model that distorts one or more design conditions in such a manner that the distortion is compensated is proposed for pavement systems. Other uses of model facilities are also discussed herein. A short analysis is made in the estimation of the desired size of the model and the required power of the motor for various gear configurations, loads, speeds, and scale ratios. It is recommended that a model be constructed for testing a single-wheel assembly traveling at low speeds at this stage of study. KEYWORDS: Airfields; Landing mat design; Mathematical models; Pavement design; Similitude; Unsurfaced airfields		

DD FORM 1473

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Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, HUNTER ARMY AIRFIELD, SAVANNAH, GEORGIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1972	31	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1971		
b. PROJECT NO.	Miscellaneous Paper S-72-8	
Q6-1		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 757 387	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Hunter Army Airfield (HAAF) in March 1971. The inspection was limited to visual observations, and not tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Hunter Army Airfield, Savannah, Georgia]</p>		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

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Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
OBSERVATION OF C-5A OPERATIONS ON LANDING MAT TEST FACILITY, DYESS AIR FORCE BASE, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Hugh L. Green		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1972	36	0
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1G664717DHO1-10	Miscellaneous Paper S-72-10	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 919 835L	
10. DISTRIBUTION STATEMENT		
Distribution limited to U. S. Government agencies only; test and evaluation; March 1972. Other requests for this document must be referred to U. S. Army Materiel Command (AMCRD-GM).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
This report describes observations made during operations of the C-5A aircraft at the landing mat test strip at Dyess AFB, Texas, and describes the resulting damage which occurred on one of the landings. Included are photographs showing the damaged mat and a detailed report on damage sustained by the C-5A aircraft.		
KEYWORDS: Damage; Landing mat failures; [C-5A aircraft; Dyess Air Force Base, Abilene, Texas]		

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REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE INVESTIGATION OF FULL-DEPTH ASPHALTIC CONCRETE OVERLAYS ON HIGHWAYS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) George M. Hamnutt, II		
6. REPORT DATE April 1972	7a. TOTAL NO. OF PAGES 17	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-12	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A033 149	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The purpose of this investigation was to conduct a study of Corps of Engineers pavement overlay design to determine if it would be possible to reduce the thickness of an overlay if a rigid pavement was overlaid with full-depth asphalt. This study indicated that for material meeting Corps of Engineers guide specifications, there would not be an equivalency ratio between asphalt-bound and unbound material. However, for material not meeting Corps of Engineers specifications, it is possible to upgrade these materials by the addition of asphalt and thereby reduce the thickness requirements for the asphalt-bound material.		
KEYWORDS: Asphalt overlays; Bituminous concretes; Overlays (Pavements)		

DD FORM 1473

NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
ENGINEER DESIGN TESTS OF DUST-CONTROL MATERIALS AND EMPLACEMENT EQUIPMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Moody M. Culpepper Warren A. Wilvert		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972	47	1
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO. 1G664717DH01		Miscellaneous Paper S-72-14
c. Tasks 12 and 13		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)
d.		AD 745 086
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command, Washington, D. C., and U. S. Army Mobility Equipment Research & Development Center, Ft. Belvoir
13. ABSTRACT		
<p>This report describes and presents the results of engineer design tests (EDT) of two dust-control materials, a polyvinyl acetate (PVA) water emulsion and a cationic asphalt-neoprene emulsion (CANE), and two distributors, one pneumatic and one mechanical, that were used to apply the PVA and CANE. Both distributors were used to apply the PVA and CANE with no reinforcing, with fiberglass scrim reinforcing, and with prechopped fiberglass reinforcing to sand and clay soils in an intermediate climate. The materials were allowed to cure for 4 hr after placement and were then subjected to the simulated airblast of a CH-47 helicopter and a C-130 aircraft and to traffic by 1/4- and 2-1/2-ton vehicles. Only minor deficiencies in the PVA and CANE, i.e., instability in storage, excessive runoff, and tackiness after 4 hr curing time, were observed during testing. The pneumatic distributor sprayed both materials with ease, but the mechanical distributor encountered difficulty in spraying the CANE. Based on the results of the investigation reported herein, the following recommendations are considered warranted: (a) Action should be initiated to correct the deficiencies in PVA and CANE. (b) Fiberglass scrim should be used as reinforcing material until equipment capable of placing prechopped fiberglass at the required rates and in the required quantities can be devised and developed. (c) Investigations for improving the distributor pump should be continued. (d) All edges of film-forming dust-control materials that may be exposed to blast should be anchored by burying. (e) Film-forming dust-control materials that are to be subjected to traffic should be reinforced.</p>		
KEYWORDS: Asphalt emulsions; Construction equipment; Dust control; Emulsions; Materials		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
2. REPORT TITLE EVALUATION OF ANCILLARY ITEMS FOR XM18 and XM19 LANDING MATS		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report		
5. AUTHOR(S) (First name, middle initial, last name) Gordon L. Carr		
3. REPORT DATE May 1972	7a. TOTAL NO. OF PAGES 124	7b. NO. OF REFS 7
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-16	
b. PROJECT NO. 1G664717DH01, Task 10	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 743 161	
c.		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT An investigation was conducted to evaluate ancillary items for use with XM18 and XM19 landing mats. Traffic and field tests were conducted to obtain information for use in comparing the performance life of the ancillary items with the performance life requirement for landing mat. Various turn adapters, access adapters, starting connectors, half panels, repair panels, closure panels, edge anchors, anchor attachments, and turndown adapters were tested. Engineer design tests were conducted on mat-surfaced prepared subgrades, with a rolling wheel load simulating actual aircraft operations. The turn adapters, access adapters, starting connectors, and half panels withstood 1100 coverages of the required load on a 4-CBR subgrade. The initial repair panels sustained a maximum of 152 coverages on a 4-CBR subgrade; failures occurred along the diagonal overlap connectors. A revised repair panel sustained over twice as many coverages as were sustained during the first test on a 4-CBR subgrade. The closure panels sustained only 50 coverages on a 4-CBR subgrade. The anchors proved successful in the field tests. It is recommended that (a) the turn adapters, access adapters, starting connectors, and half panels be accepted as standard items; (b) the XM19 repair panel design be studied and improvements be made to increase the service life of the item; (c) the requirement for a closure panel be studied as to its practicability in regard to design, cost, and need in field construction; and (d) the edge anchor and modified anchor attachments be accepted as standard items. KEYWORDS: Anchors (Fasteners); Landing mats; Subgrades; Traffic tests; [XM18 and XM19 landing mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

1. Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.

1. ORIGINATING AGENCY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, CAMPBELL ARMY AIRFIELD, FORT CAMPBELL, KENTUCKY			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros S. J. Alford			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972		19	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1971		Miscellaneous Paper S-72-19	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Q6-1		AD 743 462	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
The purpose of this report is to present the results of an investigation performed at Campbell Army Airfield (CAAF) in April 1971. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Campbell Army Airfield, Fort Campbell, Kentucky]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Program or author)		2. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		25. GROUP	
CONDITION SURVEY, DAVISON ARMY AIRFIELD, FORT BELVOIR, VIRGINIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros Ralph D. Jackson			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
June 1972	13		
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)		
OM, A, FY 1971	Miscellaneous Paper S-72-20		
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
Q6-1	AD 743 463		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
<p>The purpose of this report is to present the results of an inspection performed at Davison Army Airfield (DAAF) in August 1971. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.</p>			
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Davison Army Airfield, Fort Belvoir, Virginia]</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, FORNEY ARMY AIRFIELD, FORT LEONARD WOOD, MISSOURI		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AU (MORIS) (First name, middle initial, last name)		
Philip J. Vedros Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972	9	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1971		
9. PROJECT NO.	Miscellaneous Paper S-72-22	
Q6-1		
c.	9d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 743 856	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Forney Army Airfield (FAAF) in April 1971. The inspection was limited to visual observations, and no tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Forney Army Airfield, Fort Leonard Wood, Missouri]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

Source classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, REDSTONE ARMY AIRFIELD, HUNTSVILLE, ALABAMA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros S. J. Alford			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972		16	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
OSM, A, FY 19--		Miscellaneous Paper S-72-23	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned to the report)	
06-1		AD 743 857	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
The purpose of this report is to present the results of an investigation performed at Redstone Army Airfield (RAAF) in April 1971. The inspection was limited to visual observations, and no tests were conducted on the existing runway and taxiways.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Redstone Army Airfield, Huntsville, Alabama]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified;</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, FORT POLK ARMY AIRFIELD, FORT POLK, LOUISIANA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972	15	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1971		
b. PROJECT NO.	Miscellaneous Paper S-72-24	
Q6-1		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 743 858	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an investigation at Fort Polk Army Airfield (FPAA) in March 1971. The inspection was limited to visual observations and no tests were conducted on the existing runways and taxiways at that time. In June 1971, the U. S. Army Engineer Waterways Experiment Station (WES) performed tests at six locations in connection with a research study in which vibratory equipment and small auger holes were studied as a means of performing evaluation tests. Results of these tests are shown in table 1. A layout of the airfield pavements showing the locations of the auger holes is shown in plate 1.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Fort Polk Army Airfield, Fort Polk, Louisiana]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

DOCUMENT CONTROL DATA - R & D		
<i>(Overall classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY, SHERMAN ARMY AIRFIELD, FORT LEAVENWORTH, KANSAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1972	13	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
OSM, A, FY 1971	Miscellaneous Paper S-72-25	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
Q6-1	AD 743 912	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Sherman Army Airfield (SAAF) in April 1971. The inspection was limited to visual observations, and no tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); [Sherman Army Airfield, Fort Leavenworth, Kansas]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Schedule classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE CONDITION SURVEY, BUTTS ARMY AIRFIELD, FORT CARSON, COLORADO			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros Ralph D. Jackson			
6. REPORT DATE June 1972		7a. TOTAL NO. OF PAGES 11	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. O&M, A, FY 1972		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-26	
8b. PROJECT NO. Q6-1			
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 743 859	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT The purpose of this report is to present the results of an inspection performed at Butts Army Airfield (BAAF) in September 1971. The inspection was limited to visual observations, and no tests were conducted on any of the pavement facilities.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Butts Army Airfield, Fort Carson, Colorado]			

DD FORM 1373, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

REPLACES DD FORM 1373, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE EROSION CONTROL AT THE ABES FACILITY, KIRTLAND AIR FORCE BASE, NEW MEXICO			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Clarence R. Styron III			
6. REPORT DATE June 1972		7a. TOTAL NO. OF PAGES 14	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-27	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 744 783	
c.			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Defense Nuclear Agency Washington, D. C.	
13. ABSTRACT This report describes application of a dust-control system, DCA-1295 reinforced with fiberglass, for erosion control. Application conditions were unusual in several ways. A soil sterilant was used prior to application of the DCA-1295/fiberglass system after it was ascertained that the sterilant would be compatible with the dust-control materials. A soil sterilant was deemed necessary because the most common type of vegetation in this area, tumbleweed, is ineffective in controlling erosion. Vegetative growth occurring after the dust-control materials had been placed would have destroyed the system. Most of the area to be treated was on slopes ranging from 1V on 4H to 1V on 2H. Vehicular traffic (e.g. that of distributor vehicles) was not possible in the area; therefore, all materials were applied using hand-held hoses. Most of the 1V on 4H slopes were covered by cables and wire mesh; therefore, short glass fibers were used for reinforcing on these slopes. The remaining area, though steeper, was relatively uncluttered, and fiberglass scrim was used for reinforcing. Because persistent high winds made placement of the fiberglass fabric impossible, a portion of the project area was sprayed with DCA-1295 and left unreinforced until more favorable wind conditions would allow Sandia Base personnel to place the reinforcing and secure it in place. Based on the results obtained in this investigation, the following conclusions are believed warranted: (a) the soil sterilant used (Hyvar X) is compatible with fiberglass and DCA-1295; (b) use of the stabilization system discussed herein at the specified design rates will control erosion; (c) chopped glass is easier to apply on steep slopes than the scrim, mainly due to the weight of the packages (30 versus 25 lb), and (d) cutter guns, considered unsuitable for large projects, are ideal for special jobs such as the ABES project where small areas can be covered in a reasonable time.			
KEYWORDS: Dust control; Erosion control; Fibers; Materials; Soil stabilization; [Kirtland Air Force Base, New Mexico]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE LITERATURE REVIEW OF SKID-MEASURING EQUIPMENT AND TECHNIQUES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Alfred H. Joseph Robert A. Address		
6. REPORT DATE June 1972	7a. TOTAL NO. OF PAGES 33	7b. NO. OF REFS 30
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-28	
b. PROJECT NO. 4DM78012AQ61		
c. Task Area No. 008	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 901 528L	
d.		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; June 1972. Other requests for this document must be referred to Office, Chief of Engineers (DAEN-MCZ-A).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT <p>The U. S. Army Engineer Waterways Experiment Station was directed to make a comprehensive review of publications containing information about existing methods for measuring skid resistance of rigid and flexible pavements. Based on this review, a skid-resistance measuring device was selected for use by the Army. Literature reviewed included reports of investigations by various agencies of the U. S. Government as well as by State governments, foreign governments, and private research and development organizations. These reports described equipment that ranged from simple inexpensive devices to complex systems costing many thousands of dollars. The review represents the first phase of a study of the skid resistance of pavements. Follow-on studies will include field testing of the selected method for measuring skid resistance and an investigation of treatments to improve the skid resistance of pavements where needed. The aim of this overall study will be to (a) select a skid-resistance measuring device for flexible and rigid pavements, (b) use results obtained therewith to establish when the surface of the pavement needs upgrading, and (c) provide a maintenance procedure for improving the skid resistance of pavement to an acceptable level.</p> <p>KEYWORDS: Concrete pavements; Flexible pavements; Measuring instruments; Skid resistance; State of the art studies</p>		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

~~Unclassified~~
~~Security Classification~~

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP																					
3. REPORT TITLE UH-1H DOWNWASH VELOCITY MEASUREMENTS																							
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report																							
5. AUTHOR(S) (First name, middle initial, last name) Grady W. Leese																							
6. REPORT DATE August 1972		7a. TOTAL NO. OF PAGES 16																					
		7b. NO. OF REFS 0																					
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-31																					
9a. PROJECT NO.																							
9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD A034 667																							
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.																							
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Mobility Equipment Research and Development Center Fort Belvoir, Virginia																					
13. ABSTRACT Field measurements were made to determine the velocity of the horizontal and vertical downwash flow beneath the rotor of a UH-1H helicopter. Maximum downwash velocities measured during 7-sec periods were as follows:																							
<table border="1"> <thead> <tr> <th rowspan="2">Direction of Flow</th> <th rowspan="2">Distance from Center of Rotor Rotation, ft</th> <th colspan="2">Aircraft Position</th> <th rowspan="2">Maximum Downwash Velocity mph</th> <th rowspan="2">Remarks</th> </tr> <tr> <th>Hover Height ft</th> <th>Heading* deg</th> </tr> </thead> <tbody> <tr> <td>Horizontal</td> <td>41</td> <td>10</td> <td>360</td> <td>59</td> <td>--</td> </tr> <tr> <td>Vertical</td> <td>29</td> <td>30</td> <td>270</td> <td>30</td> <td>6' above ground</td> </tr> </tbody> </table>				Direction of Flow	Distance from Center of Rotor Rotation, ft	Aircraft Position		Maximum Downwash Velocity mph	Remarks	Hover Height ft	Heading* deg	Horizontal	41	10	360	59	--	Vertical	29	30	270	30	6' above ground
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Horizontal	41	10	360	59	--																		
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*Referenced to instrument line: 360-deg heading, aircraft facing line. 270-deg heading, aircraft rotated 90 deg left.																							
KEYWORDS: Blast effects; Helicopters; Velocity																							

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Unclassified
~~Security Classification~~

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DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE RELATIVE SURFACING REQUIREMENTS FOR CONTAINER-HANDLING VEHICLES		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Donald N. Brown Richard J. Lacavich A. A. Clark Edgar S. Rush		
6. REPORT DATE November 1972	7a. TOTAL NO. OF PAGES 71	7b. NO. OF REFS 9
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-34
b. PROJECT NO. 4A0662013A859		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 905 195L
c. Task 01		
d. Work Unit 011		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; November 1972. Other requests for this document must be referred to Director, U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This paper presents techniques for analyzing relative surfacing requirements for container-handling equipment. Its primary object is to emphasize the importance of evaluating the effects of vehicle characteristics on surfacing requirements prior to procurement of specific vehicles. At the present, cross-country mobility and the effect that vehicles have on bridges are the only military engineering considerations that have had a major influence on equipment design and selection. Container-handling equipment is broken down into five major categories: forklifts, straddle carriers, yard gantries, mobile cranes, and tractor-trailers. Examples of each of these categories plus the LARC LX amphibian were evaluated for operation on four different surfaces. The Waterways Experiment Station VCI system was employed to determine their ability to operate on beaches and soils of limited strength. The criteria for operation of aircraft on unsurfaced areas were used for medium- and high-strength soils, and criteria for the design of military roads and airfields were employed in the analysis for M8A1 landing mat and flexible pavement. Results of the study indicate that exceptionally large amounts of engineering support will be required for some types of equipment such as the large mobile cranes. None of the equipment was particularly suited to beach operation although it would be possible for some items to operate with limited payloads on dense sands. The M8A1 light-duty landing mat was found to be satisfactory only for two types of equipment and for periods of limited duration. The study also pointed out the need for a better understanding of traffic patterns within container storage areas and the statistical distribution of gross container weights. KEYWORDS: Container handling vehicles; Light duty landing mats; Mobility; Off-road vehicles; Requirements; Surfacing.		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE EVALUATION OF HARVEY ALUMINUM 1- BY 12-FT EXTRUDED LIGHT-DUTY LANDING MAT WITH SYMMETRICAL BUTT-TYPE END CONNECTORS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Hugh L. Green			
6. REPORT DATE October 1972		7a. TOTAL NO. OF PAGES 65	7b. NO. OF REFS 9
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-28	
b. PROJECT NO. 10664717DH01		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 752 079	
c. Task 10			
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command, Washington, D. C. U. S. Air Force Weapons Laboratory, Air Force Systems Command Kirtland Air Force Base, N. Mex.	
13. ABSTRACT The investigation reported herein was conducted to evaluate an extruded aluminum alloy landing mat that was designed and fabricated by Harvey Aluminum Company, Inc., Torrance, Calif. The 1- by 12-ft mat is a one-piece hollow extrusion fabricated from 6063 aluminum alloy artificially aged to the T6 condition and weighs 2.61 lb per square foot of plating area. The mat panels are interlocked along the sides by means of a hinge-type connector, the components of which are integral parts of the basic extrusion. End connectors, which are composed of 6061-T6 extruded aluminum connectors with integral inserts welded to the basic panel using the electron beam welding method, consist of symmetrical butt-type sections that are secured by a locking bar after individual panels have been joined together. The investigation consisted of laboratory, traffic, and skid tests to obtain information for use in evaluating Harvey mat for potential use as a light-duty landing mat. The test data reported herein were evaluated against the criteria for light-duty mat as established in the revised Qualitative Materiel Requirement presented as Appendix A. Traffic tests were conducted with the mat placed on a prepared subgrade and trafficked with a rolling wheel load simulating actual aircraft operations. The tests were conducted using the C-130 aircraft loading, which consists of a single-wheel load of 30,000 lb with a tire inflation pressure of 100 psi, on a subgrade with an average CBR of 3.2. Results of this investigation revealed that the Harvey light-duty mat sustained 160 actual coverages of traffic on a subgrade with a rated CBR of 3.1, which is equivalent to 430 coverages on a 4-CBR subgrade. This falls short of the coverage criterion for light-duty mat, i.e., 1000 coverages on a 4-CBR subgrade. Failure of the panels occurred in the mat body, with breakage in the top skins, bottom skins, and internal vertical members. No failures occurred at the end joints in the vicinity of the welds even though voids were present in the welds in some areas. The placement rate of the mat was 350 sq ft per man-hour. The average coefficients of friction obtained from skid tests on wet and dry surfaces were 0.57 and 0.58, respectively. The tire wear resulting from skidding on both the wet and dry surfaces was not considered significant. Laboratory tests conducted on the mat indicated that the 6063-T6 alloy generally exceeded the minimum physical requirements. KEYWORDS: Aluminum landing mats; Traffic tests; [Harvey landing mats]			

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS
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Security Classification

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Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF XM20 AND XM20E1 LANDING MATS UNDER HEAVY-DUTY LOAD		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Carroll J. Smith		
6. REPORT DATE December 1972	7a. TOTAL NO. OF PAGES 66	7b. NO. OF REFS 11
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-39	
b. PROJECT NO. 1G664717DH01, Task 10 (formerly 1G664717D556, Task 01)		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 753 935	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT <p>This report describes investigations conducted to evaluate two aluminum alloy landing mats manufactured by the Dow Chemical Company, Madison, Ill. These mats were designated as XM20 and XM20E1, and they are one-piece hollow extrusions fabricated from 6061 aluminum alloy artificially aged to the T6 condition. The XM20E1 mat is basically identical in design with the XM20 mat with the exception that geometrical changes in both male and female connectors were incorporated in the XM20 design to provide additional strength in these areas. Both the XM20 and the XM20E1 mats are interlocked along the sides by means of hinge-type connectors, the components of which are an integral part of the basic panel extrusion. End connectors are composed of extruded connectors welded to the basic panel and consist of an overlap and underlap section secured by a locking bar after individual panels have been joined together. These investigations consisted of traffic, skid, and laboratory tests to obtain information for use in evaluating the mats for potential use as heavy-duty landing mats. An AM2 repair panel was also included in the XM20 test in order to evaluate its performance under heavy-duty load conditions. The XM20 mat was also evaluated as a medium-duty mat in a previous investigation. The test data reported herein were evaluated against the criteria for heavy-duty mat as established in the revised Qualitative Materiel Requirement (QMR). Traffic tests were conducted with the mats placed on a prepared subgrade and trafficked with a rolling wheel load simulating actual aircraft operations. The XM20 and XM20E1 mats were assembled at an average rate of 445 and 617 sq ft per man-hour, respectively. These placing rates exceeded the minimum QMR rate of 150 sq ft per man-hour. The average weights of the XM20 and XM20E1 mats were 6.09 and 6.05 lb per square foot of placing area, respectively. The traffic tests were conducted with a 50,000-lb single-wheel load with a tire-inflation pressure of 250 psi on a mat-surfaced subgrade with initial average CBR's of 3.6 and 4.0 for the XM20 and XM20E1 mats, respectively. Results indicated that when placed on a subgrade with a rated CBR of 4.0, the XM20 mat would sustain 610 coverages of traffic, and the XM20E1 mat would sustain 620 coverages. These results did not meet the QMR service life of 1000 coverages on a 4.0-CBR subgrade for a heavy-duty mat. The AM2 repair panel sustained 124 coverages on a subgrade with a CBR of 3.6. The average coefficients of friction obtained from wet and dry skid tests were 0.38 and 0.52, respectively, for the XM20 mat and 0.34 and 0.56, respectively, for the XM20E1 mat. The coefficients of friction on wet surfaces for both mats fell below the QMR coefficient of friction range of 0.4 to 0.8. The coefficients of friction of 0.38 and 0.52 for the XM20 mat were determined in a previous investigation wherein it was evaluated as a medium-duty mat. Laboratory tests conducted on both mats indicated that the 6061-T6 alloy exceeded the minimum physical requirements stipulated.</p> <p>KEYWORDS: Aluminum landing mats; [Dow landing mats; XM20 and XM20E1 landing mats]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

372

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE EVALUATION OF DOW CHEMICAL EXTRUDED TRUSS-WEB LANDING MAT			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. A. AUTHOR(S) (First name, middle initial, last name) Dewey W. White, Jr.			
6. REPORT DATE December 1972		7a. TOTAL NO. OF PAGES 88	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-72-40	
b. PROJECT NO.			
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 753 921	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT The investigation reported herein was conducted to evaluate 2- by 24-ft truss-web aluminum alloy extrusions without end connectors and truss-web aluminum alloy heavy-duty landing mat designed by Dow Chemical Company, Midland, Mich. The truss-web extrusions were one-piece multi-hollow 6061-T6 aluminum alloy extrusions without end connectors and were 1-1/2 in. thick, 2 ft wide, and 24 ft long. No antiskid material was applied to the extrusions. After the 2- by 24-ft truss-web extrusions were tested under traffic, Dow supplied 2- by 9-ft landing-mat panels, and these were evaluated. The mat is a one-piece multi-hollow extrusion fabricated from 6061-T6 aluminum alloy, 1-1/2 in. thick, 2 ft wide, and 9 ft long, and has antiskid material on the top surface. The investigation of the mat consisted of traffic tests; skid tests; cable roll-over, hook-impact, jet-blast, and temperature-impingement tests; and laboratory tests. The tests were designed to evaluate the service life and performance of the truss-web mat in accordance with the Qualitative Materiel Requirement. Traffic tests were conducted on quantities of the 2- by 24-ft extrusions (internal ribs and side connectors perpendicular to the direction of wheel travel of load cart) without end connectors; 2- by 9-ft truss-web mat placed in the standard placement pattern (side connectors and internal ribs perpendicular to the direction of wheel travel); and 2- by 9-ft mat placed in a longitudinal placement pattern (side connectors and internal ribs parallel to wheel travel). The traffic tests were conducted with the 24-ft-long extrusions and 9-ft-long mats on prepared subgrades using rolling-wheel load simulating actual aircraft operations. The truss-web extrusions withstood 1534 coverages (1410 coverages on a subgrade with a 4.0 CBR) and an additional 2466 single-line passes on a 5.0 CBR (total of 4000 passes on one lane of the test section). A total of 2000 coverages (equivalent to 1612 coverages on subgrade with a 4.0 CBR) were applied on the 2- by 9-ft mat in the standard placement pattern before failure occurred. Two hundred coverages (equivalent to 240 coverages on a subgrade with a 4.0 CBR) were applied on the truss-web mat in the longitudinal pattern before the hinging action of the mat allowed the subgrade to flow outward from the center of the test section. This caused a trough to form; thus, the test section was considered failed due to roughness. Laboratory tensile-strength tests conducted on samples taken from the top sheet, ribs, and bottom sheet of truss-web landing mat revealed that the tensile strength of the material was within specified requirements. Further study and testing are recommended in order to develop a waterproof version of truss-web landing mat, which will eliminate the requirement for membrane to be placed beneath the mat to prevent water penetration into the subgrade. This water penetration causes the subgrade strength to deteriorate. KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Laboratory tests; Traffic tests; [Dow Chemical Co.]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE TRIP TO EUROPEAN RESEARCH INSTITUTIONS RELATIVE TO WORK OF SOILS AND PAVEMENTS LABORATORY		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) S. J. Johnson		
6. REPORT DATE December 1972	7a. TOTAL NO. OF PAGES 175	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper - Unnumbered	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		WES
12. ABSTRACT Research institutes visited were: University of Durham, Durham, England; Norwegian Geotechnical Institute, Oslo, Norway; Swedish Geotechnical Institute, Stockholm, Sweden; Danish Geotechnical Institute, Copenhagen, Denmark; University of Cambridge, Cambridge, England; Engineering Geology Division, Imperial College of Science & Technology, London, England; Soil Mechanics Laboratories, Imperial College of Science & Technology, London, England; U. S. Army Research & Development Group, European Research Office, London, England; and National Civil Engineering Laboratory, Lisbon, Portugal.		
KEYWORDS: Bituminous laboratories; Soil mechanics laboratories		

DD FORM 1473, 1 NOV 66
REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
STRENGTHENING OF KEYED LONGITUDINAL CONSTRUCTION JOINTS IN RIGID PAVEMENTS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final Report April 1971 - May 1972			
5. AUTHOR(S) (Last name, middle initial, first name)			
Robert W. Grau			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
August 1972		116	9
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
FAA Inter-Agency Agreement No. DOT FA71WAL- b. PROJECT NO. 218 AFWL Air Force Project Order No. F29601- c. 71-X-0007		Miscellaneous Paper S-72-43	
d.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
		FAA-RD-72-106 AD 758 570	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Federal Aviation Administration Systems Research and Development Service Washington, D. C. 20591 and Air Force Weapons Laboratory Kirkland Air Force Base Albuquerque, New Mexico 87117	
13. ABSTRACT			
<p>The rigid pavement test section was constructed of portland cement concrete (PCC) and trafficked with a 360-kip 12-wheel assembly and a 166-kip twin-tandem assembly to evaluate the performance of keyed and doweled longitudinal construction joints in rigid airfield pavement under multiple-wheel heavy gear loadings (MWHGL) and to investigate the feasibility of strengthening existing keyed longitudinal joints. The findings from this investigation are as follows: (1) The performance of keyed joints of rigid pavements on medium-strength ($k = 200 - 400$ pci) foundations was marginal; (2) it is feasible to strengthen the keyed joints in existing rigid pavements that are founded on low- to medium-strength ($k < 400$ pci) materials and are in good condition if the airfield is scheduled for MWHGL aircraft traffic; (3) keyed longitudinal construction joints in existing rigid pavements constructed on high-strength ($k > 400$ pci) or stabilized soil foundations will probably perform satisfactorily under MWHGL aircraft traffic; (4) a sand-filter course beneath a pavement structure will be effective in minimizing subgrade pumping; (5) a 6-in.-thick stabilized base course placed over a low-strength ($k < 200$ pci) subgrade is very effective in increasing the load-carrying capacity of a 10-in.-thick nonreinforced PCC pavement; and (6) doweled longitudinal construction joints in rigid pavements constructed on low-, medium, and high-strength subgrades ($k < 200$ to > 400 pci) performed satisfactorily under MWHGL traffic.</p> <p>KEYWORDS: Construction joints; Multiple wheel landing gear; Rigid pavement performance and evaluation; Runways; Traffic tests</p>			

DD FORM 1473
1 NOV 65REPLACES DD FORM 1473, 1 JAN 61, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

<p>Unclassified Security Classification</p>		
<p>DOCUMENT CONTROL DATA - R & D</p> <p>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</p>		
<p>1. ORIGINATING ACTIVITY (Corporate author)</p> <p>U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi</p>		<p>2a. REPORT SECURITY CLASSIFICATION</p> <p>Unclassified</p>
		<p>2b. GROUP</p>
<p>3. REPORT TITLE</p> <p>CONSTRUCTION OF FIBROUS REINFORCED CONCRETE OVERLAY TEST SLABS, TAMPA INTERNATIONAL AIRPORT, FLORIDA</p>		
<p>4. DESCRIPTIVE NOTES (Type of report and inclusive dates)</p> <p>Interim Report</p>		
<p>5. AUTHOR(S) (First name, middle initial, last name)</p> <p>Frazier Parker, Jr.</p>		
<p>6. REPORT DATE</p> <p>October 1972</p>	<p>7a. TOTAL NO. OF PAGES</p> <p>66</p>	<p>7b. NO. OF REFS</p>
<p>8a. CONTRACT OR GRANT NO.</p> <p>FA71-WAI-218</p>	<p>8b. ORIGINATOR'S REPORT NUMBER(S)</p> <p>Miscellaneous Paper S-72-44</p>	
<p>b. PROJECT NO.</p> <p>Work Unit No. 082-420-014</p>	<p>9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)</p> <p>FAA-RD-72-119 AD 760 638</p>	
<p>10. DISTRIBUTION STATEMENT</p> <p>Approved for public release; distribution unlimited.</p>		
<p>11. SUPPLEMENTARY NOTES</p>		<p>12. SPONSORING MILITARY ACTIVITY</p> <p>Department of Transportation Federal Aviation Administration Systems Research and Development Service Washington, D. C. 20521</p>
<p>13. ABSTRACT</p> <p>This report describes the planning and construction of two fibrous reinforced concrete overlay test sections at TIA. The test sections included 4- and 6-in.- thick overlays located on a currently used parallel taxiway to one of the primary N-S runways. The test sections were inspected after about one month's traffic, and the condition of the overlays is described herein. Conclusions based on the construction of the test section indicate that fibrous reinforced concrete can be produced in a central mix plant and placed with a slip-form paver. Procedures and equipment for bulkhandling of the fibers will have to be developed.</p>		
<p>KEYWORDS: Fiber reinforced concrete; Overlays (Pavements); Rigid pavement construction; [Tampa International Airport, Tampa, Florida]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

M, F, P

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
2. REPORT TITLE		12b. GROUP	
ANALYSIS OF THE ABILITY OF A LASER PROFILESOMETER SYSTEM TO EVALUATE UNPREPARED LANDING SITES			
3. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
4. AUTHOR(S) (First name, middle initial, last name)			
Lewis E. Link, Jr.			
5. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF PAGES
May 1973		84	7
6a. CONTRACT OR GRANT NO.		6b. ORIGINATOR'S REPORT NUMBER(S)	
a. PROJECT NO. 1V021701A047		Miscellaneous Paper M-73-7	
c.		10. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 763 180	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT			
<p>A study was made to determine the feasibility of using an airborne laser profilometer system to rapidly appraise selected unprepared landing sites. Evaluation of terrain roughness was made in terms of microrelief, slope, and obstructions. Laser profilometer data were collected at 12 test areas that provided variations in surface geometry, vegetation cover, and other natural and man-made features. The inherent characteristics of the laser profilometer system and the extraneous noise present in the laser profilometer output prevented a direct quantitative comparison of the laser profilometer output and reference profiles of the terrain. To overcome this difficulty, a procedure was developed for interpreting the laser profilometer output to obtain an interpreted terrain profile for comparison with reference profiles. A total of 17 specific terrain features at the 12 test areas were chosen for analysis of the capabilities of the laser profilometer system. Comparisons of the dimensions of the features as measured on the interpreted terrain profiles and reference profiles showed that the height of terrain features could be measured with a probable error of 4 in. and a maximum error of approximately 12 in. The ability of the laser profilometer system to measure terrain slope was evaluated by comparing measurements of the change in elevation over a 328-ft interval as obtained on laser profilometer outputs and photogrammetric reference profiles. The laser profilometer system did not accurately measure terrain slope in direction (+ or -) or magnitude.</p> <p>KEYWORDS: Field tests; Lasers; Microgeometry; Profilometers; Terrain; Unsurfaced runway performance and evaluation</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY, GRAY ARMY AIRFIELD, FORT LEWIS, WASHINGTON		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1973	12	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1972		
a. PROJECT NO.	Miscellaneous Paper S-73-2	
Q6-1		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD 756 446	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C.
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Gray Army Airfield (GAAP), Fort Lewis, Washington, during October 1971. The inspection was limited to general observations, and no tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Gray Army Airfield, Fort Lewis, Washington]</p>		

DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

1 NOV 66 1473

Unclassified

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE STUDY OF BEHAVIOR OF BITUMINOUS-STABILIZED PAVEMENT LAYERS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Cecil D. Burns Richard H. Ledbetter Robert W. Grau			
6. REPORT DATE March 1973		7a. TOTAL NO. OF PAGES 97	7b. NO. OF REFS 5
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-4	
b. PROJECT NO. C-1, Task 03, Work Unit 004			
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT The investigation reported herein was conducted to (a) compare the performance of bituminous-stabilized base and subbase materials with that of unbound granular materials as used in the original multiple-wheel, heavy gear load (MWHGL) test section and (b) determine the difference in performance between a high quality bituminous base constructed of crushed aggregate and a bituminous base constructed of a lower quality uncrushed material. A test section was constructed within the existing MWHGL test section at the U. S. Army Engineer Waterways Experiment Station (WES), utilizing the existing h.O-CBR clay subgrade. The test section consisted of four test items. Items 1 and 2 were constructed to a thickness of 15 in., and items 3 and 4 to a total thickness of 24 in. In item 1, the granular base and subbase used in the original construction were replaced by a bituminous-stabilized base constructed of the uncrushed gravelly-sand subbase material used in the original MWHGL test section. Cement filler of 6.5 percent was used with the aggregate to improve the gradation. Item 2 was identical with item 1, except for the 12-in. base, which was constructed of a high quality asphaltic concrete containing crushed limestone. In item 3, the unbound crushed-stone base used in the MWHGL test section was replaced by a high quality asphaltic-concrete base, and the gravelly-sand subbase in the bottom 15 in. of the structure was stabilized with asphalt cement. Item 4 was identical with item 3, except that the gravelly sand was not stabilized. A 3-in.-thick surface layer of high quality asphaltic concrete was constructed over all test items. The test items were subjected to traffic with a simulated C-5A main gear 12-wheel assembly with a 360,000-lb gross load and with a 75,000-lb single-wheel assembly. The results of tests showed that: the performance of the bituminous-bound base and subbase materials was superior to that of similar pavements constructed of unbound granular materials used in the original MWHGL test section at the WES, the quality of aggregate used in the bituminous base courses had a significant effect on pavement performance, and the greatest benefit from bituminous stabilization was in upgrading the quality of poor-to-borderline materials.			
KEYWORDS: Aggregates; Base courses; Bituminous soil stabilization; Flexible pavements; Granular materials; Layered systems; Subbases; Subgrades; Traffic tests			

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
RAPID ROAD CONSTRUCTION USING MEMBRANE-ENVELOPED SOIL LAYERS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Alfred H. Joseph Ralph D. Jackson Steve L. Webster		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1973	78	5
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 4A062112A859	Miscellaneous Paper S-73-5	
c. Task 01	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d. Work Unit 001	AD 757 397	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT Military roads require high-strength foundation layers to support ground vehicles in the theater of operations (TO). In many instances, sizable construction effort and costs are required in obtaining material and producing suitable roads. New road building techniques are needed to reduce the construction time and costs of these roads. The objective of this investigation was to develop construction techniques and procedures for employing a membrane-enveloped soil layer (MESL) as a base course to allow rapid road construction in the TO. Construction techniques for encapsulating in situ or locally available fine-grained soils in waterproof membranes were developed. A test road was built containing both MESL and conventional-type base courses. Traffic tests were conducted, and construction requirements for MESL base courses were determined. A demonstration MESL road was then constructed to test the MESL concept. Also, a test facility for rapidly evaluating membrane materials and other surfacings for military roads was designed and constructed. Various surfacing materials were tested using this new facility. The test facility is a vast improvement over previously used methods for applying traffic. The results of the investigation indicate that a fine-grained soil can be used in MESL base course road construction and can be protected successfully from surface and subsurface water intrusion. Compaction of a full 12-in. MESL of fine-grained soil to 95 percent of CE 12 density (AASHTO T-180 Method) is sufficient to support traffic operations of a 5-ton, 6x6 military dump truck loaded to its maximum weight for highway travel. Sheets of 6-mil-thick polyethylene can be used as the lower membrane for the MESL. Of the upper membranes tested, the asphalt polypropylene membrane containing a single layer of product D performed the best. This membrane survived over 55,000 coverages of traffic with no failures.		
KEYWORDS: Membrane enveloped soil layer; Military roads; Rapid road construction; Traffic tests		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

380

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE C-5A AIRCRAFT LIVE FLIGHT SUPPORT TEST OPERATIONS, HARPER LAKE, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Robert W. Grau		
6. REPORT DATE February 1973	7a. TOTAL NO. OF PAGES 31	7b. NO. OF REFS 6
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-6
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 907 989L
c.		
d.		
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; February 1973. Other requests for this document must be referred to Office, Chief of Engineers (DAEN-MER-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT C-5A aircraft live flight support test operations were conducted during the period 7 May through 5 June 1970 to determine the ability of the C-5A to operate from unsurfaced landing areas. The U. S. Army Engineer Waterways Experiment Station supported the Air Force Weapons Laboratory, at their request, in obtaining soil measurements to determine the effects of the aircraft operations on unsurfaced landing areas. The test site was located at Harper Lake, California, near Edwards Air Force Base. The surface soil at the test site was lean clay. It was found that: During these tests, the C-5A aircraft with gross loads of 571,000 lb and main-gear tire pressures up to 105 psi operated on lean clay subgrades with strengths of 15 CBR or more; however, the tests did not permit evaluation of the aircraft capability on unsurfaced soils of lower strength. The minimum turning radius required for the C-5A to execute a 360-deg turn on a lean clay subgrade was about 85 ft. The dust clouds formed during aircraft ground operations constituted visibility and maintenance problems. It is recommended that an evaluation of C-5A aircraft operations be conducted on a soil with characteristics more typical of support-area airfields than was the soil at Harper Lake. The data obtained from this test should then be supplemented with laboratory tests, model tests, and theoretical analyses.		
KEYWORDS: Aircraft landing areas; Cargo aircraft; Clays; Soil strength; Unsurfaced airfields; Unsurfaced runway performance and evaluation; [C-5A aircraft; Harper Lake, Calif.]		

DD FORM 1, NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

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Security Classification

AD-A045 025

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG--ETC F/G 1/5
A BIBLIOGRAPHY WITH ABSTRACTS OF U.S. ARMY ENGINEER WATERWAYS E--ETC(U)
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Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF GOODYEAR MEDIUM-DUTY ALUMINUM HONEYCOMB LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report		
5. AUTHOR(S) (First name, middle initial, last name) Gordon L. Carr		
6. REPORT DATE March 1973	7a. TOTAL NO. OF PAGES 41	7b. NO. OF REFS 9
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-8	
b. PROJECT NO. 1G664717DH01-10		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 758 444	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation to evaluate a medium-duty aluminum honeycomb-core landing mat designed and fabricated by Goodyear Aerospace Corporation, Akron, Ohio, as a result of the Government request for proposal dated 6 May 1968. The medium-duty mat was a sandwich-type structure with a honeycomb core bonded by an epoxy film adhesive to aluminum top and bottom skins. Extruded aluminum edge connectors were also bonded with a similar adhesive to the top and bottom skins and to the core. Individual panels were joined along two edges with a hinge-type connection and along the adjacent two edges by overlap-/underlap-type connections that were locked together by insertion of a connector bar. The panel dimensions, weight, and placing rate were 4 ft by 4 ft by 1.5 in., 67.5 lb, and 478 square feet per man-hour, respectively. The weight per square foot of placing area was 4.1 lb. Traffic and skid tests were conducted to obtain information for evaluating the service life and performance of the medium-duty mat as specified by project requirements. Laboratory tests were performed to determine the mechanical properties of the mat panels and their component parts, and results indicated that the materials in the mat met the specified requirements. The traffic tests were conducted with a rolling wheel load, simulating aircraft operations on mat placed on a prepared subgrade. The tests were conducted using a single-wheel load of 25,000 lb with a tire-inflation pressure of 250 psi on a mat-surfaced subgrade with a rated CBR of 3.8. The Goodyear medium-duty mat sustained 622 coverages of traffic under the above-stated conditions, which is equivalent to 890 coverages on a 4.0-CBR subgrade; thus, the mat failed to meet current requirements of 1000 coverages on a 4.0-CBR subgrade. The medium-duty mat sustained almost twice as many coverages as a previously tested Goodyear all-bonded mat. Failure of individual panels resulted from a gradual depression of the surface of the panels caused by failure of the adhesive between the core and skins and by overstressing of the adhesive between the edge connectors and skins. The coefficients of friction obtained from dry and wet skid tests were 0.57 and 0.45, respectively.		
KEYWORDS: Aluminum landing mats; Honeycomb structures; Traffic tests; [Goodyear aluminum mats]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF DOW CHEMICAL COMPANY EXTRUDED ALUMINUM 4-PIECE 4- BY 4-FT LANDING MAT (MX18-E)		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Dewey W. White, Jr.		
6. REPORT DATE March 1973	7a. TOTAL NO. OF PAGES 46	7b. NO. OF REFS 2
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-9	
b. PROJECT NO. 16664717DH01-10 (Formerly 16664717D556-01)	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.	AD 758 445	
d.		
10. DISTRIBUTION STATEMENT APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT <p>The investigation reported herein was conducted to evaluate an aluminum alloy landing mat (designated MX18-E) designed and extruded by the Dow Chemical Company, Midland, Michigan. The mat, which was fabricated by Dow's subcontractor, Washington Aluminum Company (WACO), Enterprise, Ala., is a 4- by 4-ft, four-piece, 6061-T6 aluminum alloy panel. (The panel consisted of four 12-in.-wide extrusions welded together to form the 4-ft width.) The panels when placed are joined along two edges by interlocking male and female hinge-type connectors, which are integral parts of the basic panel extrusion. The adjacent edges consist of extruded aluminum overlap and underlap connectors that are welded to the basic panel. A locking bar secures these connectors after individual panels have been nested. This investigation consisted of traffic tests to evaluate the service life of the Dow MX18-E mat against the criteria specified in the Department of the Army (DA) approved Qualitative Materiel Requirement (QMR) for Prefabricated Airfield Surfacing dated 14 April 1966. The traffic tests were conducted with a rolling wheel load that simulated aircraft operations on mat placed on a prepared subgrade. The tests were conducted with an F-4C tire loaded to 25,000 lb with the tire inflated to 250-psi pressure on a mat-surfaced subgrade with a rated CBR of 3.6 for item 1 (MX18-E mat oriented with its internal ribs perpendicular to the direction of traffic) and a rated CBR of 4.0 for item 2 (MX18-E mat with its internal ribs parallel to traffic). The MX18-E mat sustained 460 coverages on item 1 and 580 coverages on item 2, which is equivalent to 710 coverages for item 1 and 580 coverages for item 2 on a 4.0-CBR subgrade. These coverages exceed the QMR service life of 200 coverages on a 4.0-CBR subgrade. The service life of the MX18-E mat placed with the internal ribs parallel to traffic was only 81.7 percent of the life of the mat with the internal ribs perpendicular to traffic. The mat can be placed on a flat subgrade at a rate of 263 sq ft per man-hour, which exceeds the minimum required of 250 sq ft per man hour.</p> <p>KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [MX18E landing mat, Dow Chemical Company]</p>		

DD FORM 1 NOV 65 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		12a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		12b. GROUP
CONDITION SURVEY, BIGGS ARMY AIRFIELD, FORT BLISS, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
March 1973	6	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1972		
b. PROJECT NO.	Miscellaneous Paper S-73-10	
Q6-1		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 758 446	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Biggs Army Airfield (BAAF), Fort Bliss, Texas, during January 1972. The inspection was limited to visual observations, and no tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Biggs Army Airfield, Fort Bliss, Texas]</p>		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi 39160		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF KAISER MX19-B AND MX19-C ALUMINUM HONEYCOMB LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Gordon L. Carr Dave A. Ellison		
6. REPORT DATE March 1973	7a. TOTAL NO. OF PAGES 53	7b. NO. OF REFS 12
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-11	
b. PROJECT NO. 17062103A046		
c. Task 05	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 758 840	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes an investigation conducted to evaluate the MX19 aluminum honeycomb-core landing mat with modified male and female hinge-type connectors. The MX19 mat, designed and fabricated by Kaiser Aluminum and Chemical Sales, Inc., Oakland, Calif., was a sandwich-type structure composed of an aluminum honeycomb core bonded by an adhesive to top and bottom aluminum sheets. The extruded aluminum edge connectors were welded to the sheets and bonded with adhesive to the core. The panels were joined along two edges by a hinge-type male/female connection. The adjacent edges were joined by an overlap/underlap connection secured by a locking bar. In previous engineer design tests of MX19 mat, although results indicated that the mat exceeded by 175 percent the Qualitative Materiel Requirement (QMR) service life of 200 coverages, a fairly consistent failure mode was established along the female connector. Field performances in Vietnam indicated that a longer service life would be required than that specified by the QMR and that sustained by the MX19 mat. Since the QMR was soon to be revised to require a service life of 1000 coverages, the manufacturer's design efforts were directed toward extending the service life of the MX19 mat. Subsequently, modifications were made in both the male and the female connectors. The MX19 mat with modifications in both connectors was designated MX19-B, and the mat with modifications in only the female connector was designated MX19-C. This investigation consisted of traffic and skid tests to obtain information on the effectiveness of the modified connectors in extending the service life of the mats and on the skid-resistance and tire-wear characteristics of the mat surfaces, respectively. The traffic tests were conducted on a test section with rated CBR's of 4.3 and 4.2 for the MX19-B and MX19-C, respectively, using a 25,000-lb single-wheel load with a tire-inflation pressure of 250 psi. Results of the investigation indicated that the MX19-B would sustain 750 coverages and the MX19-C, in excess of 2050 coverages on a 4.0-CBR subgrade. Thus, the service life of the MX19-C mat should exceed by 10 times that of the QMR (200 coverages) and by approximately 4 times that of the MX19 mat (550 coverages). The coefficients of friction of the mat surfaces during dry and wet conditions were 0.32 and 0.22, respectively. These coefficients of friction were lower than those determined for the MX19 mat in a previous investigation and did not meet the QMR performance specification of a 0.40 to 0.80 range for coefficients of friction on both dry and wet surfaces. KEYWORDS: Aluminum landing mats; Honeycomb structures; Traffic tests; [Kaiser landing mats; MX19 landing mat]		

DD FORM 1473, 1 JAN 64, WHICH IS REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE CONDITION SURVEY, ELLSWORTH AIR FORCE BASE, SOUTH DAKOTA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros			
6. REPORT DATE April 1973		7a. TOTAL NO. OF PAGES 19	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-12	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD A032 885	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C.	
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Ellsworth Air Force Base (EAFB), South Dakota, during 6-9 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of pavements, foundations, or patching materials were performed during this survey. The annual pavement maintenance plan for EAFB is presented in Appendix A. KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Ellsworth Air Force Base, South Dakota]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Overall classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, WURTSMITH AIR FORCE BASE, MICHIGAN			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Veagos Henry T. Thornton, Jr.			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
April 1973	10		
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO.	Miscellaneous Paper S-73-13		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.	AD A032 886		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C.	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at Wurtsmith Air Force Base (WAFB), Michigan, during 1-5 May 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey. Appendix A to this report presents the annual pavement maintenance plan for WAFB.</p>			
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Wurtsmith Air Force Base, Michigan]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE CONDITION SURVEY, ALTUS AIR FORCE BASE, OKLAHOMA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Ralph D. Jackson		
6. REPORT DATE April 1973	7a. TOTAL NO. OF PAGES 24	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-14	
9a. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.	AD A032 887	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Altus Air Force Base (AAFB), Oklahoma, during 14-17 May 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey. KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Altus Air Force Base, Oklahoma]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, K. I. SAWYER AIR FORCE BASE, MICHIGAN			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Henry T. Thornton, Jr. S. J. Alford			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
April 1973	8		
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)		
b. PROJECT NO.	Miscellaneous Paper S-73-15		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
d.	AD A032 912		
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C.	
13. ABSTRACT			
<p>The purpose of the report is to present the results of a condition survey performed at K. I. Sawyer Air Force Base (KISAFB), Michigan, during 24-25 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements.</p>			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Sawyer Air Force Base, Michigan]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, ROBERT GRAY ARMY AIRFIELD, FORT HOOD, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Vedros, Philip J. Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1973	17	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
O&M, A, FY 1972	Miscellaneous Paper S-73-16	
b. PROJECT NO. Q6-1		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 888	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C.
13. ABSTRACT		
<p>The purpose of the report is to present the results of an inspection performed at Robert Gray Army Airfield (HGAAP), Fort Hood, Texas, during January 1972. The inspection was limited to visual observations, and no tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Robert Gray Army Airfield, Fort Hood, Texas]</p>		

DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

ARMY CLASSIFICATION

DOCUMENT CONTROL DATA - R & D

(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, BEALE AIR FORCE BASE, CALIFORNIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1973		21	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-73-18	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 889	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20315	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at Beale Air Force Base (BAFB); California, during 4-7 November 1972. The following two major areas of interest were considered in this condition survey. (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of pavements, foundations, or patching materials were performed during this survey.</p>			
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Beale Air Force Base, California]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, CASTLE AIR FORCE BASE, CALIFORNIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Philip J. Vedros			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1973		33	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-73-19	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 890	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at Castle Air Force Base (CAFB), California, during 8-10 November 1972. The following two major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. This report is limited to a presentation of visual observations, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of pavements, foundations, or patching materials were performed during this survey.</p>			
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Castle Air Force Base, California]</p>			

DD FORM 173

REPLACES DD FORM 173, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		20. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		20. GROUP
CONDITION SURVEY, MALMSTROM AIR FORCE BASE, MONTANA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1973	25	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-73-22	
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD A032 892	
c.		
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Malmstrom Air Force Base (MAFB), Montana, during 24-27 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Malmstrom Air Force Base, Montana]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Creative classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE CONDITION SURVEY, MINOT AIR FORCE BASE, NORTH DAKOTA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros			
6. REPORT DATE April 1973		7a. TOTAL NO. OF PAGES 39	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-23	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD A032 913	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Minot Air Force Base (MAFB), North Dakota, during 11-15 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey. KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Minot Air Force Base, North Dakota]			

DD FORM 1473

1 NOV 62

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE EVALUATION OF STRUCTURAL LAYERS IN FLEXIBLE PAVEMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Robert W. Grau		
6. REPORT DATE May 1973	7a. TOTAL NO. OF PAGES 131	7b. NO. OF REFS 15
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-26	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 762 131	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT The investigation reported herein was conducted to evaluate the effectiveness of stabilized structural layers (lime- and cement-stabilized layers) in pavement performance and to determine the comparative performance between a full-depth high-quality crushed stone and the stabilized layers during simulated aircraft traffic. The comparative performance between the stabilized layers and similar pavements consisting of unbound granular base and subbase materials previously tested in the Multiple Wheel Heavy Gear Load (MWHGL) test section was also determined. A test section was constructed within two items of the existing MWHGL test section at the U. S. Army Engineer Waterways Experiment Station in order to utilize the existing 4-CBR clay subgrade. The test section consisted of four 24-in.-thick items. The structural layers above the subgrade for the respective items were: item 1, a 15-in.-thick lime-stabilized lean clay layer overlaid with 6 in. of crushed stone and 3 in. of asphaltic concrete (AC); item 2, a 15-in.-thick cement-stabilized lean clay layer overlaid with 6 in. of crushed stone and 3 in. of AC; item 3, a 21-in.-thick crushed stone base and 3 in. of AC; and item 4, a 21-in.-thick cement-stabilized clayey gravelly sand layer overlaid with 3 in. of AC. Items 1 and 2 were trafficked with a 360-kip 12-wheel assembly, a 160-kip twin-tandem assembly, and a 50-kip single-wheel assembly; items 3 and 4 were trafficked with a 200-kip twin-tandem assembly and a 75-kip single-wheel assembly. Mixed traffic was applied to item 4 with the 360-kip 12-wheel and 75-kip single-wheel assemblies. KEYWORDS: Crushed stone; Evaluation; Flexible pavements; Layered systems; Traffic tests		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE DESIGN OF LANDING-MAT-SURFACED AIRFIELDS FOR OPERATION OF C-5A AIRCRAFT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Don N. Brown Victor C. Barber		
6. REPORT DATE May 1973	7a. TOTAL NO. OF PAGES 63	7b. NO. OF REFS 13
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-27	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 911 509L	
10. DISTRIBUTION STATEMENT Distribution limited to U. S. Government agencies only; test and evaluation; May 1973. Other requests for this document must be referred to the Office, Chief of Engineers (DAEN-MER-D).		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT This investigation was conducted to evaluate and/or modify, if necessary, existing criteria for the design of landing-mat-surfaced airfields to be subjected to operations of the C-5A aircraft. A specially prepared test section was constructed and trafficked. The test section consisted of one test lane that included four items: two designed to evaluate strength requirements for landing-mat-surfaced soil and two designed to evaluate thickness requirements for landing-mat-surfaced soil. The test items were trafficked with one main gear of the C-5A aircraft (12-wheel gear arrangement) loaded to 360 kips. The analysis of the test data obtained in this investigation indicated that the existing criteria would have to be modified for application to the design of landing-mat-surfaced airfields for use by the C-5A aircraft.		
<div style="border: 1px solid black; padding: 5px; text-align: center;"><p>CAUTION</p><p>The design procedure and criteria developed in the reported investigation are pertinent only to free-rolling loads of flotation-type aircraft and thus apply to the design of facilities such as taxiways, aprons, etc. The effects of high-speed braking operations of the C-5A aircraft on runways are still under study. Until the conditions leading to failure of AM2 mat (similar to XM18 mat) under high-speed braking on landing roll-out of the C-5A can be defined and controlled, landing of this aircraft on mat cannot be accommodated with certainty.</p></div>		
KEYWORDS: Cargo aircraft; Landing mat design; Medium duty landing mat; Traffic tests; [C-5A aircraft]		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
2. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, McCONNELL AIR FORCE BASE, KANSAS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Ralph D. Jackson			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1973		21	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-73-29	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 915	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at McConnell Air Force Base (MAFB), Kansas, during 8-12 May 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>			
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [McConnell Air Force Base, Kansas]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, KINCHELOE AIR FORCE BASE, MICHIGAN			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Henry T. Thornton Philip J. Vedros			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1973		30	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-73-30	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 916	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at Kincheloe Air Force Base (KAFB), Michigan, during 27-29 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>			
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Kincheloe Air Force Base, Michigan]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 60, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Complete classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE CONDITION SURVEY, MATHER AIR FORCE BASE, CALIFORNIA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Philip J. Vedros			
6. REPORT DATE May 1973		7a. TOTAL NO. OF PAGES 26	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-31	
b. PROJECT NO.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
c.		AD A032 917	
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Mather Air Force Base (MAFB), California, during 31 October-3 November 1972. The following two major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) Condition of pavement repairs and the types of maintenance materials that have been used at this airfield. This report is limited to a presentation of visual observations of the pavement conditions, discussion of the observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey. KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Mather Air Force Base, Sacramento, Calif.]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Unclassified Security Classification		
DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE CONDITION SURVEY, GLASGOW AIR FORCE BASE, MONTANA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Ralph D. Jackson		
6. REPORT DATE May 1973	7a. TOTAL NO. OF PAGES 24	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-33	
8c. PROJECT NO.		
9.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10.	AD A032 918	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Glasgow Air Force Base (GAFB), Montana, during 17-20 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Glasgow Air Force Base, Montana]		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotations must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY, PEASE AIR FORCE BASE, NEW HAMPSHIRE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1973	28	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-34	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 919	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Pease Air Force Base (PAFB), New Hampshire, during 14-18 August 1972. The inspection for effects of frost action was performed on 1 June 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Pease Air Force Base, Portsmouth, New Hampshire]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, MARCH AIR FORCE BASE, CALIFORNIA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	28	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-73-38	
9a. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD A032 920	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at March Air Force Base (MAFB), California, during 30 November-6 December 1972. The following two major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [March Air Force Base, Riverside, California]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		19. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
2. REPORT TITLE		20. GROUP
CONDITION SURVEY, CARSWELL AIR FORCE BASE, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	24	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-39	
c.	8d. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 927	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Carswell Air Force Base (CAFB), Texas, during 16-19 December 1972. The following two major areas of interest were considered in this survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Overlays (Pavements); Rigid pavement performance and evaluation (Airfields); [Carswell Air Force Base, Texas]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 62, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified	
3. REPORT TITLE CONDITION SURVEY, WESTOVER AIR FORCE BASE, MASSACHUSETTS		2b. GROUP	
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name) Ralph D. Jackson			
6. REPORT DATE June 1973	7a. TOTAL NO. OF PAGES 37	7b. NO. OF REFS	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-41		
b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)		
c.	AD A032 928		
d.			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Westover Air Force Base (WAFB), Massachusetts, during 21-24 August 1972. The frost action inspection was performed during 7-8 June 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of those observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Westover Air Force Base, Massachusetts]			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, GRAND FORKS AIR FORCE BASE, NORTH DAKOTA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros Henry T. Thornton, Jr.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	36	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-42	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Grand Forks Air Force Base (GFAFB), North Dakota, during 18-22 April 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Grand Forks Air Force Base, North Dakota]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, summary of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE CONDITION SURVEY, DYESS AIR FORCE BASE, TEXAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Ralph D. Jackson		
6. REPORT DATE June 1973	7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. b. PROJECT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-43	
c. d.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT <p>The purpose of this report is to present the results of a condition survey performed at Dyess Air Force Base (DAFB), Texas, during 11-14 December 1972. The following two major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Dyess Air Force Base, Abilene, Texas]		

DD FORM 1473, 1 JAN 66, WHICH IS
 1 NOV 66
 OBSOLETE FOR ARMY USE.

Unclassified
 Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing punctuation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY, FORBES AIR FORCE BASE, KANSAS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	26	
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-44	
c.	8c. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 929	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Forbes Air Force Base (FAFB), Kansas, during 1-6 May 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any evidence of detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Forbes Air Force Base, Kansas]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY, WHITEMAN AIR FORCE BASE, MISSOURI		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros S. J. Alford		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	35	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-45	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 930	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Whiteman Air Force Base (WAFB), Missouri, during 9-13 May 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Whiteman Air Force Base, Missouri]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

408

DOCUMENT CONTROL DATA - R & D		
(Locally classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. CRO 30
CONDITION SURVEY, PLATTSBURGH AIR FORCE BASE, NEW YORK		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	21	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-46	
c.	9b. OTHER REPORT NUM(S) (Any other numbers that may be assigned this report)	
d.	AD A032 931	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Plattsburgh Air Force Base (PAFB), New York, during 7-10 August 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
KEYWORDS: Rigid pavement performance and evaluation (Airfields); [Plattsburgh Air Force Base, New York]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		2b. GROUP
CONDITION SURVEY, FT. DEVENS ARMY AIRFIELD, FT. DEVENS, MASSACHUSETTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Ralph D. Jackson Philip J. Vedros		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	11	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-73-47	
8b. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
	AD A032 932	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Ft. Devens Army Airfield (DAAF), Ft. Devens, Massachusetts, during August 1972. The inspection was limited to visual observations, and no tests were conducted on the existing runways and taxiways.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Overlays (Pavements); [Ft. Devens Army Airfield, Ft. Devens, Massachusetts]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		1a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
CONDITION SURVEY, LAGUNA ARMY AIRFIELD, YUMA PROVING GROUND, ARIZONA		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name)		
Philip J. Vedros Ralph D. Jackson S. J. Alford		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	19	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-50	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 933	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of an inspection performed at Laguna Army Airfield (LAAP), Yuma Proving Ground, Arizona, during December 1972. The inspection was limited to visual observations, and no tests were conducted on any of the pavement facilities.</p>		
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Laguna Army Airfield, Yuma Proving Ground, Arizona]</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<small>(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE CONDITION SURVEY, LORING AIR FORCE BASE, MAINE		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (First name, middle initial, last name) Ralph P. Jackson		
6. REPORT DATE June 1973	7a. TOTAL NO. OF PAGES 35	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-51	
9. PROJECT NO.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD A032 934	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT The purpose of this report is to present the results of a condition survey performed at Loring Air Force Base (LAFB), Maine, during 27 July-1 August 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Loring Air Force Base, Limestone, Maine]		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		12. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
3. REPORT TITLE		16. GROUP
CONDITION SURVEY, BANGOR INTERNATIONAL AIRPORT, BANGOR, MAINE		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
5. AUTHOR(S) (Last name, middle initial, first name)		
Ralph D. Jackson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973	29	
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.	Miscellaneous Paper S-73-52	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD A032 935	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314
13. ABSTRACT		
<p>The purpose of this report is to present the results of a condition survey performed at Bangor International Airport (formerly Dow Air Force Base), Bangor, Maine, during 1-4 August 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>		
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Bangor International Airport, Bangor, Maine]		

DD FORM 1473

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Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security Classification of title, body of abstract and indexing notation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
		2b. GROUP	
3. REPORT TITLE			
CONDITION SURVEY, LOCKBOURNE AIR FORCE BASE, OHIO			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Ralph D. Jackson			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973		30	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-73-54	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 936	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at Lockbourne Air Force Base (LAFB), Ohio, during 28-30 August 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of the observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>			
<p>KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Lockbourne Air Force Base, Ohio]</p>			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
CONDITION SURVEY, WRIGHT-PATTERSON AIR FORCE BASE, OHIO			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
5. AUTHOR(S) (First name, middle initial, last name)			
Ralph D. Jackson			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
June 1973		30	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO.		Miscellaneous Paper S-73-55	
c.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD A032 937	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers U. S. Army Washington, D. C. 20314	
13. ABSTRACT			
<p>The purpose of this report is to present the results of a condition survey performed at Wright-Patterson Air Force Base (WAFB), Ohio, during 31 August-5 September 1972. The following three major areas of interest were considered in this condition survey: (a) The structural condition of the primary airfield pavements. (b) The condition of pavement repairs and the types of maintenance materials that have been used at this airfield. (c) Any detrimental effects of frost action to the pavement facilities. This report is limited to a presentation of visual observations of the pavement conditions, discussion of these observations, and pertinent remarks with regard to the performance of the pavements. No physical tests of the pavements, foundations, or patching materials were performed during this survey.</p>			
KEYWORDS: Flexible pavement performance and evaluation (Airfields); Rigid pavement performance and evaluation (Airfields); [Wright-Patterson Air Force Base, Dayton, Ohio]			

DD FORM 1373

REPLACES DD FORM 1373, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
LATERAL DISTRIBUTION OF AIRCRAFT TRAFFIC		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Donald N. Brown Owen O. Thompson		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
July 1973	61	9
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
	Miscellaneous Paper S-73-56	
9. PROJECT NO.		
c. MEDECC Program Task 02	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d. Work Unit 002	AD 765 435	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>In the development of pavement design and evaluation criteria for aircraft with complex gear configurations (C-5A, B-747, etc.), it has been revealed that current procedures for relating aircraft operations (passes) to pavement coverages (stress and/or deflection repetitions) are cumbersome and inaccurate. The procedure for converting aircraft passes to pavement coverages has been reexamined by developing theoretical normal traffic distribution curves and fitting these curves to the limited number of actual traffic distribution curves available for four aircraft (B-47, B-52, KC-97, and KC-135). In this manner, more realistic pass-to-coverage (p/c) ratios have been developed for most currently used military and civil aircraft. The revised p/c ratios are presented and are recommended for use in pavement design and evaluation criteria. The amount of actual traffic distribution data is recognized to be minimal, and additional data for new generations of aircraft are needed to verify or revise the presented p/c ratios.</p>		
<p>KEYWORDS: Aircraft; Flexible pavement design (Airfields); Rigid pavement design (Airfields); Traffic distribution; Traffic volume (Passes)</p>		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security Classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		12a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE SURFACE VELOCITIES AND TEMPERATURE CHANGES FOR C-130, C-141, AND C-5A EXHAUST BLASTS AND C-5A WING-TIP VORTEX		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) James W. Carr		
6. REPORT DATE June 1973	7a. TOTAL NO. OF PAGES 39	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-61	
b. PROJECT NO. 17062112A131		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 764 228	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes a series of field investigations conducted to determine exhaust- blast velocities and temperatures at the ground level for various aircraft and the wing-tip vortex velocity of the C-5A. Measurements of exhaust-blast velocities and temperature rise during static conditions were collected for C-130, C-141, and C-5A aircraft. Taxi, breakaway, and lift-off tests were conducted with the C-141 and C-5A to record velocity during actual aircraft operations. Wind velocity created by the wing-tip vortex of the C-5A was recorded during actual aircraft operations. Results of these tests indicate that temperature increases from engine exhaust blasts are not sufficient to cause detrimental effects on runway surfacing in use to date. Maximum temperature increases due to exhaust blast were 180 deg Fahrenheit (F) for the C-130, 90 deg F for the C-141, and 85 deg F for the C-5A. Operations of C-141 and C-5A pro- duced exhaust-blast velocities at the ground surface of 120 and 135 mph, respectively. These velocities are sufficient to possibly cause uplift of various mat panels pres- ently in use.		
KEYWORDS: Cargo aircraft; Exhaust blast effects		

DD FORM 1473
1 NOV 66

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS
OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE FLEXIBLE PAVEMENT ANALYSIS BY THE THREE-DIMENSIONAL FINITE ELEMENT METHOD		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) John B. Palmerton		
6. REPORT DATE October 1973	7a. TOTAL NO. OF PAGES 31	7b. NO. OF REFS 5
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-63	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 770 383	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT <p>The investigation reported herein was a preliminary study to evaluate the applicability of three-dimensional finite element analysis for predicting the behavior of pavement systems. Since many pavement problems are not reducible to plane behavior, this new analysis technique should provide a good basis for future analysis of complicated pavement systems. The finite element computer program used in this study is designated SOLSAP and was originally developed to investigate the three-dimensional behavior of earth and earth-rock dams. It was used in this study to investigate the effect of a static load application (similar to that produced by the C-5A aircraft) on a flexible pavement section that had been previously field-tested at the U. S. Army Engineer Waterways Experiment Station. SOLSAP considers both nonlinear stress-strain behavior and nonlinear volume characteristics. Deflections measured in the previous field study are compared with those calculated by program SOLSAP. The agreement is quite good considering the many idealizations and assumptions introduced into the three-dimensional finite element analysis. These idealizations include the crudeness of the mesh, the choice of material properties, and the application of the wheel loads in a single step. Nevertheless, the results serve to demonstrate the feasibility of applying the three-dimensional finite element method to predict pavement behavior.</p> <p>KEYWORDS: Computer programs; Finite element method; Flexible pavements; Pavement deflection; Performance predictions</p>		

DD FORM 1473

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Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified
		2b. GROUP
3. REPORT TITLE		
DEVELOPMENT OF MINIMUM PIPE-COVER REQUIREMENTS FOR C-5A AND OTHER AIRCRAFT LOADINGS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (Last name, middle initial, first name)		
Charles C. Calhoun, Jr. Harry H. Ulery, Jr.		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
November 1973	94	43
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 4A06203A859	Miscellaneous Paper S-73-65	
c. Task 02, Work Unit 022	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 771 174	
10. DISTRIBUTION STATEMENT		
APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Office, Chief of Engineers, U. S. Army Washington, D. C.
13. ABSTRACT		
<p>This investigation was conducted to develop structural requirements (minimum cover tables) for buried pipe beneath flexible- and rigid-pavement, landing-mat-surfaced, and unsurfaced airfields subject to operations of the C-5A and other aircraft in the theater of operations. Present design practices were reviewed, and computer programs based on the present design practices were written and used to predict pipe behavior under various loadings. Stress-at-depth data from full-scale load cart tests, field surveys, and tests of pipe subjected to the C-5A and other loadings were analyzed, and the field behavior was compared with predicted behavior. Minimum pipe-cover requirements were developed for rigid and flexible pipe buried beneath airfields to be subjected to operations of the C-5A and other aircraft. These pipe-cover requirements are intended for use in conjunction with Department of the Army TM 5-330/AFM 86-3, Vol II, "Planning and Design of Roads, Airbases, and Heliports in the Theater of Operations," but because of their general nature, the cover requirements are applicable to all airfields.</p>		
KEYWORDS: Buried conduits; Flexible pipes; Pipe cover; Requirements; Traffic loads		

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Unclassified
Security Classification

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Corps of Engineers Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE THE BEHAVIOR OF FLEXIBLE AIRFIELD PAVEMENTS UNDER LOADS--THEORY AND EXPERIMENTS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) 1 April 1971 through 1 April 1973		
5. AUTHOR(S) (First name, middle initial, last name) Y. T. Chou, R. H. Ledbetter		
6. REPORT DATE July 1973	7a. TOTAL NO. OF PAGES 176	7b. NO. OF REFS 33
8a. CONTRACT OR GRANT NO. Project Order F29601-71-X-0011	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-66	
8b. PROJECT NO. 683M		
c. Task 4	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 766 480; AFWL-TR-72-215	
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY AFWL (DEZ) Kirtland AFB, NM 87117
13. ABSTRACT (Distribution Limitation Statement A) The instrumentation data of the multiple-wheel heavy gear load (MWHGL) tests were reduced and analyzed. By incorporating the performance of test pavements under traffic, relations between load and pavement response were established. A method was developed to compute the measured stresses and deflections of the test pavements; based on the method, the stresses and deflections can be computed for similar types of airfield pavements under different loads. Correlations were established between computed parameters and traffic performance data from the MWHGL test section as well as from many other pavement tests conducted by the Corps of Engineers. Based on the instrumentation data, the principle of superposition was found to be valid for flexible pavements. Attempts were made to reevaluate the equivalent single-wheel loads for MWHGLs by many different methods. KEYWORDS: Aircraft loads; Flexible pavements; Pavement deflection; Stress-strain relations		

DD FORM 1473
1 NOV 61UNCLASSIFIED
Security Classification

420

Unclassified Security Classification		
DOCUMENT CONTROL DATA - R & D <small>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</small>		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP
3. REPORT TITLE ENGINEER DESIGN TESTS OF MODIFIED DUST-CONTROL MATERIALS AND PROTOTYPE EQUIPMENT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Moody M. Culpepper Richard Osmond		
6. REPORT DATE December 1973	7a. TOTAL NO. OF PAGES 136	7b. NO. OF REFS 1
8a. CONTRACT OR GRANT NO. b. PROJECT NO. 1G664717DHO1 c. Tasks 12 and 13 d.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-67 9b. OTHER REPORT NUMBER(S) (Any other numbers that may be assigned this report) AD 772 961
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT <p>Engineer design tests were performed on a dust-control system, i.e. material and prototype emplacement equipment, from 18 December 1970 to 2 August 1971. The performance of the dust-control material exceeded the criteria of the currently existent Qualitative Materiel Requirement. Only minor deficiencies were noted and these deficiencies will be corrected by specification changes that will place closer controls on suppliers of dust-control materials. The liquid distributor for dust control described herein performed well on-road, off-road, and during spraying operations. There were no major equipment failures. The minor deficiencies that were encountered could be readily corrected. During the tests, modifications were made that improved vehicle operation. Design changes will be required in order to meet the vehicle weight requirement and to improve the maintainability of the vehicle. Based on the results of the tests reported herein, it is concluded that the dust-control system is suitable for engineering tests/expanded service tests.</p>		
KEYWORDS: Construction equipment; Design standards; Dust control; Materials		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

 Unclassified
 Security Classification

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate author) US Army Engineers Waterways Experiment Station Vicksburg, Mississippi 39181		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED
		2b. GROUP
3. REPORT TITLE AN INVESTIGATION OF THE STRUCTURAL PROPERTIES OF STABILIZED LAYERS IN FLEXIBLE PAVEMENT SYSTEMS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) February 1971-August 1973		
5. AUTHOR(S) (First name, middle initial, last name) W. R. Barker; W. N. Brabston; F. C. Townsend		
6. REPORT DATE October 1973	7a. TOTAL NO. OF PAGES 166	7b. NO. OF REFS 29
8a. CONTRACT OR GRANT NO. F29601-71-X-0008	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-69 AFWL-TR-73-21	
b. PROJECT NO. 683M		
c. Task No. 4	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 769 292	
10. DISTRIBUTION STATEMENT Approved for public release; distribution Unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY AFWL (DEZ) Kirtland AFB, NM 87117
13. ABSTRACT (Distribution Limitation Statement A) In recent years mechanistic models have been advocated as a tool for predicting the performance of pavement systems under aircraft traffic. In the investigation reported herein, layered elastic and nonlinear finite element models were used to determine the benefit of stabilized layers within a pavement system. The performance of several types of pavement structures that were constructed and trafficked under controlled conditions at the US Army Engineer Waterways Experiment Station were analyzed with respect to predicted response, measured response, and manifestation of traffic distress in the pavement systems. From the analysis, relationships were developed between pavement life and predicted response such that the benefit of the use of stabilized materials within a pavement system could be examined based on the influence which the material would have on the predicted life of the pavement system.		
KEYWORDS: Airfields; Finite element method; Flexible pavements; Layered systems; Mathematical models; Pavement design; Performance predictions		

DD FORM 1473
1 NOV 65

UNCLASSIFIED

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D		
<i>(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)</i>		
1. ORIGINATING ACTIVITY (Corporate Author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE INVESTIGATION OF DUST-CONTROL MATERIALS		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Clarence R. Styron III Royce C. Eaves		
6. REPORT DATE December 1973	7a. TOTAL NO. OF PAGES 68	7b. NO. OF REFS 22
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-73-70
b. PROJECT NO. 1V021701A046 1G643324D556		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 774 834
c. 1G664717DH01		
d.		
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT This report describes a program instituted in an attempt to control dust during military operations in the Southeast Asia theater of operations. Dust was reported to be seriously reducing the life expectancy of machinery, increasing the time required for refueling and other services, increasing logistics problems, seriously lowering the morale of troops, and in some instances providing the enemy with dust signatures of the locations of operations. The U. S. Army Engineer Waterways Experiment Station compiled a list of essential and desirable characteristics for a dust-control agent, and these were used as guidelines during the intervening period before a Qualitative Materiel Requirement for Dust-Control Materiel was issued on 1 August 1966 (revised) 10 May 1971). A screening procedure was set up whereby a series of tests could readily determine the potential of a material on the basis of its comparison with all others tested. Successful products were processed through a laboratory investigation, a traffic test, a downwash blast test, a weathering cycle test, and finally a field test. Seven companies under dust-control research contracts submitted approximately 29 percent of the materials tested. Approximately 56 percent of the materials field tested were contract developed, and one of these, SS-1295, a polyvinyl acetate product, was selected as having the greatest potential for satisfying the military requirements. KEYWORDS: Dust control; Materials; Military operations; [Southeast Asia]		

DD FORM 1473

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Unclassified

Security Classification

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

M, P

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper M-74-7	2. GOVT ACCESSION NO. AD A018 289	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) CHARACTERIZATION OF SELECTED ROAD SECTIONS IN WESTERN UNITED STATES		5. TYPE OF REPORT & PERIOD COVERED Unclassified
7. AUTHOR(s) Adam A. Rula James H. Robinson		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Mobility and Environmental Systems Laboratory U. S. Army Engineer Waterways Experiment Station P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Department of Agriculture, Forest Service Washington, D. C. 20250		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project 415-920-01-37-097 Order 0607-R5-74
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE September 1974
		13. NUMBER OF PAGES 41
		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Roads Subgrades Tires Unsurfaced roads Wear tests [Nevada]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Data were collected by the U. S. Army Engineer Waterways Experiment Station to characterize sections of gravel roads and courses selected for testing in conjunction with a U. S. Department of Agriculture, Forest Service, tire wear-road deterioration study. The primary purpose of the study reported herein was to describe, in quantitative terms, the surface and subgrade of selected sections of unpaved road surfaces in Oregon representative of logging roads in the western United States. Data also were collected on one road and one test		

DD FORM 1 JAN 73 1473

EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified	
		2b. GROUP	
3. REPORT TITLE SMALL APERTURE TESTING FOR AIRFIELD PAVEMENT EVALUATION			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report			
5. AUTHOR(S) (First name, middle initial, last name) Jim W. Hall, Jr. Durrell R. Elsea			
6. REPORT DATE February 1974		7a. TOTAL NO. OF PAGES 33	7b. NO. OF REFS 10
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-74-3	
b. PROJECT NO. ADM78012AQ61		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD 775 406	
c. Task 02			
d. Work Unit 003			
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT The high intensity of aircraft operations on most military airfields prohibits the closing of runways and other pavement facilities in order to measure the physical properties of the pavement necessary to evaluate its load-carrying capability. Also, the introduction of multiple-wheel heavy gear load aircraft coupled with an ever increasing number of aircraft operations has emphasized the need to know the load-carrying capability of pavement structures and to anticipate future pavement performance. The objective of this study was to develop techniques for determination of the required pavement properties that can be used with a minimum of pavement destruction and interference with aircraft operations. As a result of this study, a small aperture technique was developed to obtain CBR strength values and samples used to determine moisture, density, and classification of the pavement components through a 6-in.-diam core hole. Equipment and test procedures are discussed. Data obtained by the small aperture method are shown to agree well with those obtained by conventional test procedures. A nuclear density device developed especially for this study is discussed, and data are presented that show the accuracy of the device. The small aperture tests were not found to have a time advantage, but manpower requirements were cut in half. The tests can be performed between traffic operations, and most aircraft can operate over the 6-in.-diam core hole. KEYWORDS: Airfields; Nondestructive tests; Nuclear equipment; Pavements; Test procedures			

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Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
		2b. GROUP
3. REPORT TITLE USE OF CONCENTRATION INDEX FOR PAVEMENT DESIGN		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final report		
5. AUTHOR(S) (First name, middle initial, last name) Richard G. Ahlvin Harry H. Ulery, Jr. Y. T. Chou		
6. REPORT DATE February 1974	7a. TOTAL NO. OF PAGES 30	7b. NO. OF REFS 14
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-74-4	
8b. PROJECT NO.		
8c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
8d.	AD A035 976	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES This paper is published in "Journal, Engineering Division, American Society of Civil Engineers," Vol 99, No. 7F5, Feb 1974.		12. SPONSORING MILITARY ACTIVITY
13. ABSTRACT The application of the concentration index to pavements is illustrated. The problem with the design of flexible airfield pavements under newly developed jumbo-jet aircraft, as represented by the Lockheed C-5A Galaxy and the Boeing 747, is discussed. These aircraft are equipped with extremely large multiple-wheel landing gears. It is found that the CBR design equation can be used to evaluate the pavement performance under multiple-wheel gear assemblies when the equivalent single-wheel load (ESWL) is computed by the concentration index method. The concentration index is approximately independent of the load, gear configuration, and soil strength but varies with the depth.		
KEYWORDS: Aircraft; Flexible pavement design (Airfields); Index tests		

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Pella and Pavements Laboratory Vicksburg, Mississippi 39180		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE EVALUATION OF DOW CHEMICAL PRODUCTION EXTRUDED TRUSS-WEB LANDING MAT		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report		
5. AUTHOR(S) (First name, middle initial, last name) Dewey W. White, Jr.		
6. REPORT DATE March 1974	7a. TOTAL NO. OF PAGES 125	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-74-6	
9. PROJECT NO. 16764717DH01-10	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD A032 884	
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command 5001 Eisenhower Avenue Alexandria, Virginia 22304
13. ABSTRACT The investigation reported herein was conducted to evaluate 2- by 9-ft. truss-web, heavy-duty landing mat supplied by the Dow Chemical Company. The mat was traffic-tested to evaluate its performance relative to the requirement that heavy-duty landing mat be capable of sustaining 1000 coverages of heavy-duty loading (50,000-lb. single-wheel load (SWL), 250-psi tire inflation pressure) when placed on a 4-CBR subgrade. Traffic tests were conducted to determine the performance of the truss-web mat. These traffic tests were conducted on prepared subgrades, with a rolling wheel load simulating actual aircraft conditions. A 50,000-lb SWL with a 250-psi tire inflation pressure was used. The first quantity of mat tested was designated initial production mat. This mat failed after 250 coverages due to tire hazards caused by splits which began at the female 1-lock corners and extended along the female connectors. The subgrade was rated at 4.0 CBR. Several design modifications were studied, resulting in tapering of the female connectors at the panel corners. This consisted of cutting the corners of the female connectors off for approximately 2 in. along the connector at an angle with the panel corners. The contractor modified sufficient panels with the tapered corners for a traffic test in an effort to improve the performance of the mat. This traffic test, designated modified production test, was conducted under the same loading conditions used for the initial test. In the first phase of this test, the mat was placed on a subgrade rated at 4.0 CBR and subjected to 1040 coverages without test section failure. In addition to this traffic, two additional phases of traffic were applied prior to mat test section failure. Phase 2 consisted of traffic conducted for the American Proving Ground (APG, the agency responsible for engineering tests of heavy-duty landing mat). Since only one line of panel end joints in the standard traffic lane received 100 percent of the traffic coverages, APG requested that an additional line of panel end joints be subjected to 100 percent traffic coverage. Therefore, traffic was applied to achieve 1000 coverages on an additional line of panel end joints, and the mat successfully sustained these coverages on a subgrade rated at 4.0 CBR. Phase 3 traffic was a continuation of Phase 1 traffic until mat failure. A total of 300 additional coverages were applied to the mat on a subgrade with a CBR of 3.9 (equivalent to 336 coverages on a subgrade rated at 4.0 CBR). Therefore, it was determined that the mat will withstand 1376 coverages when placed on a 4-CBR subgrade (1040 plus 336 coverages). Skid tests conducted on this mat resulted in values for the coefficient of friction on wet (0.40) and dry (0.62) surfaces that meet the requirements of the revised Qualitative Material Requirement (runway condition reading of 13-25 or coefficient of friction of 0.40 to 0.60).		
KEYWORDS: Heavy duty landing mats; Traffic tests; [Dow landing mats]		

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Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		Unclassified
		2b. GROUP
3. REPORT TITLE		
ENGINEER DESIGN TEST OF MODIFIED XM19 SPECIAL SURFACING LANDING MAT		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Final report		
5. AUTHOR(S) (First name, middle initial, last name)		
Gordon L. Carr		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
May 1974	46	0
8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1G764717DH01-10	Miscellaneous Paper S-74-12	
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.	AD 781 480	
10. DISTRIBUTION STATEMENT		
Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT		
<p>During previous evaluations of the standard XM19 medium-duty mat, results indicated the mat would not meet the hook-impact or the cable roll-over requirements stipulated in the QMR. Inasmuch as the QMR allows a special surfacing in the cable roll-over and hook-impact areas, the standard XM19 was modified by using a thicker top skin and this mat was designated XM19 special surfacing. In conjunction with the top skin modification, the overlap and underlap edge members were changed to connectors capable of being waterproof. The mat was traffic tested with the medium-duty loading consisting of a 25,000-lb single-wheel load (SWL) on a tire inflated to 250-psi pressure. The mat supported in excess of 1600 coverages of the above loading on a subgrade strength of 4 CBR, which is 60 percent over the required coverages. The coefficients of friction of the mat surface of 0.62 dry and 0.53 wet are within the acceptable limits of 0.80 and 0.40 as specified by the QMR. The mats sustained the required 20 passes of the load cart in the same spot over a 1-in.-diam arresting cable without fracture of the top mat surface. The blast test of 300 F for 5 sec did not cause any detrimental effects, and the mats successfully passed laboratory tests for compressive, shear, and flexural strength. The hook-impact test, consisting of two impacts on the same spot without fracture of the mat surface, was also successfully passed. The placing rate of over 500 sq ft per man-hour was in excess of the QMR requirement of 250 sq ft per man-hour essential and 400 sq ft per man-hour desired.</p> <p>KEYWORDS: Medium duty landing mats; Traffic tests; [XM19 landing mat]</p>		

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1 NOV 65

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OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		Unclassified	
2b. GROUP			
3. REPORT TITLE			
CONSTRUCTION OF MESL DEMONSTRATION ROAD AT FORT HOOD, TEXAS, MAY 1972			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Steve L. Webster			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
May 1974	50	9	
8a. CONTRACT OR GRANT NO.		8b. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 4A062103A859		Miscellaneous Paper S-74-13	
c. Task 01		9b. OTHER REPORT NO. S) (Any other numbers that may be assigned this report)	
d. Work Unit 012		AD 780 756	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Office, Chief of Engineers, U. S. Army Washington, D. C.	
13. ABSTRACT			
<p>This report records the construction of a 1/2-mile membrane-enveloped soil layer (MESL) road constructed at Fort Hood, Texas, in May 1972. The road was constructed to field test MESL construction techniques and to provide a MESL road for long-term evaluation. The 24-ft-wide, 10-in.-thick MESL was constructed by personnel of the Directorate of Facilities Engineering, Fort Hood, Texas. The location was Clear Creek Road between Copperas Cove Road and U. S. Highway 190. The soil was a gravelly sandy clay (CL) with some shell. It was encapsulated using 6-mil polyethylene as the lower membrane and polypropylene fabric and SS-1h emulsified asphalt as the upper membrane. Construction of the MESL required 48 working hours and was completed in a 6-day period. A surfacing of 2 in. of hot-mix asphaltic concrete was installed on the MESL by a local contractor. Eight-foot-wide shoulders were constructed, and an asphaltic single-surface treatment was applied. The total materials, equipment usage, and construction labor cost for the MESL road with asphalt surfacing was \$20,800. The MESL road was opened to traffic in June 1972. A traffic count in July 1972 indicated an average daily usage of 1793 vehicles, of which 24.5 percent was truck traffic and 75.5 percent was passenger car traffic.</p>			
KEYWORDS: Membrane enveloped soil layer; Military roads; Rapid road construction; [Fort Hood, Texas]			

DD FORM 1473

NOV 68

REPLACES DD FORM 1473, 1 JAN 66, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified.)		
1. ORIGINATING ACTIVITY (Corporate author) U. S. Army Engineer Waterways Experiment Station Vicksburg, Miss.		2a. REPORT SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE EVALUATION OF XM18Q EXTRUDED ALUMINUM LANDING MAT		2b. GROUP
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Memorandum for record		
5. AUTHOR(S) (First name, middle initial, last name) Carroll J. Smith Dewey W. White, Jr.		
6. REPORT DATE May 1974	7a. TOTAL NO. OF PAGES 37	7b. NO. OF REFS 0
8a. CONTRACT OR GRANT NO. b. PROJECT NO. 1G764717DH01-10		9a. ORIGINATOR'S REPORT NUMBER(S) Miscellaneous Paper S-74-14
c. d.		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) AD A032 938
10. DISTRIBUTION STATEMENT Approved for public release; distribution unlimited.		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY U. S. Army Materiel Command Washington, D. C.
13. ABSTRACT <p>The investigation reported herein was conducted to evaluate an extruded aluminum alloy landing mat (designated XM18Q) supplied by the Dow Chemical Company, Madison, Ill. The mat, which was fabricated by the Washington Aluminum Company (WACO), Enterprise, Ala. (Dow's subcontractor), is a one-piece extrusion fabricated from 6061 aluminum alloy artificially aged to the T6 condition. The mat panels are interlocked along the sides by means of a hinge-type connector, the components of which are an integral part of the basic panel extrusion. End connectors, composed of extruded connectors welded to the basic panel, consist of overlap and underlap sections secured by a locking bar after individual panels have been joined together. The mat mentioned herein was different from modified XM18-R mat in that the insert tubes in the ends of the mat panels were shortened by 3/4 in. and the amount of metal was increased in the area of the female connector and first cavity adjacent to this connector. The method of attaching the end connectors to the mat extrusion was changed to allow improved welds at the corners. The investigation consisted of traffic, skid, cable roll-over, and laboratory tests to obtain information for use in evaluating the XM18Q mat for potential use as a medium-duty landing mat. The test data reported herein were evaluated against the criteria for medium-duty mat as established in the revised Qualitative Materiel Requirement (QMR). Traffic tests were conducted with the mat placed on a prepared subgrade and trafficked with a rolling wheel load simulating actual aircraft operations. The XM18Q mat, which weighs 4.8 lb per square foot of placing area, was assembled at an average rate of 600 sq ft per man-hour. The mat's weight exceeds the maximum QMR requirement for a medium-duty mat of 4.5 lb per square foot of placing area, and the placing rate exceeds the minimum QMR requirement of 250 sq ft per man-hour. The traffic tests were conducted using the F-4C loading, which consists of a single-wheel load of 25,000 lb with a tire inflation pressure of 250 psi, on a mat-surfaced subgrade with a rated CRR of 4.1. Results of this investigation revealed that the XM18Q mat sustained 940 actual coverages of traffic on a subgrade with a rated CRR of 4.1, which is equivalent to 850 coverages on a 4-CRR subgrade. This falls short of the QMR 1000-coverage requirement for a medium-duty mat on a 4-CRR subgrade. The average coefficients of friction obtained from skid tests on wet and dry surfaces were 0.45 and 0.52, respectively. These coefficients of friction fall within the QMR range of 0.4 to 0.8. The tire wear resulting from skidding on both the wet and dry surfaces was not considered significant. Cable roll-over tests were conducted on the XM18Q mat with a 1-in.-diam arresting cable trafficked with a 25,000-lb single-wheel load with a tire inflated to 250 psi. Results indicated that the mat will withstand the 20 cable roll-overs</p> <p>KEYWORDS: Aluminum landing mats; Extrusions (Landing mats); Traffic tests; [Dow landing mats; XM18Q landing mat]</p>		

DD FORM 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified
Security Classification

Unclassified

Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
U. S. Army Engineer Waterways Experiment Station Vicksburg, Mississippi		Unclassified	
3. REPORT TITLE		2b. GROUP	
HELICOPTER DOWNWASH DATA			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Final report			
5. AUTHOR(S) (First name, middle initial, last name)			
Grady W. Leese John T. Knight, Jr.			
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS	
June 1974	43	none	
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
b. PROJECT NO. 1T062013A046		Miscellaneous Paper S-74-17	
c. Task 05		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		AD 780 754	
10. DISTRIBUTION STATEMENT			
Approved for public release; distribution unlimited.			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		U. S. Army Materiel Command Washington, D. C.	
13. ABSTRACT			
This data report describes an investigation involving measurement of horizontal velocities, along and up to 6 ft above the ground surface, generated by the rotor systems of various Army helicopters during takeoff, hover, and fly-by operations. Measurements of ground-wash velocities during various operational modes were collected for OH-58A, OH-6A, AH-1G, UH-1H, UH-1M, CH-47, and CH-54 helicopters. These data are presented for record only with analyses being beyond the scope of this report.			
KEYWORDS: Blast effects; Data acquisition; Helicopters			

DD FORM 1473

REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

Unclassified

Security Classification

Security Classification

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

DD FORM 1473
1 NOV 69

Security Classification

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-74-23	2. GOVT ACCESSION NO. AD 787 257	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SOIL STABILIZATION FOR ROADS AND AIRFIELDS IN THE THEATER OF OPERATIONS		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) William N. Brabston George M. Hammitt II		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory Vicksburg, Mississippi 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Task 08, Work Unit 009
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE September 1974
		13. NUMBER OF PAGES 206
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Airfields Military roads Chemical soil stabilization Soil stabilization Design standards Subgrades Expedient construction Military construction		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objective of this study was to develop a design system for the use of chemically stabilized soil layers in pavement systems in the theater of operations. Stabilization with only portland cement, lime, and bituminous materials was considered. Two concepts of construction were envisioned in the development of this system: expedient and nonexpedient construction. The former involves that type of construction effort to be used when constraints of time, material, equipment, etc., dictate a minimization of (Continued)		

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20. ABSTRACT (Continued).

efforts. The latter involves that type of construction to be used when constraints are less severe but construction effort would be less than what would be termed deliberate. Procedures are provided for selection of type and quantity of stabilization based on soil type. Thickness design curves are presented for design of single- and multiple-layer pavements for both roads and airfields.

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

434

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-74-25	2. GOVT ACCESSION NO. AD A032 944	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) INVESTIGATION OF TAR-RUBBER PAVEMENT OVERLAYS		5. TYPE OF REPORT & PERIOD COVERED Final Report
7. AUTHOR(s) Philip J. Vedros, Jr. Ralph D. Jackson		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Headquarters, U. S. Air Force Washington, D. C. 20330		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. PREE-74-1
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE November 1974
		13. NUMBER OF PAGES 66
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Airfields Overlays (Pavements) Rubberized-tar pavements		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this study was to determine why tar-rubber pavements are experiencing failures from usage by aircraft with high tire pressures. Failures are in the form of depressions and rutting, raveling of joints, and deterioration from fuel spillage. The study was accomplished by performing pavement field studies and sampling at 10 selected airfields and subjecting the tar-rubber pavement samples from these airfields to a laboratory testing program. The investigation indicated the following: (1) Performance of tar-rubber pavements (Continued)		

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

1135

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

20. ABSTRACT (Continued).

is dependent upon the quality of construction and subsequent usage of the pavement. (2) Spillage of JP-4 fuel is more detrimental than spillage of hydraulic fluid on a short-term basis. (3) Use of heavy rubber-tired rollers appears to be necessary during construction in order to meet the density requirements. (4) Tar-rubber pavements perform poorly in all areas adjacent to refueling pits. Based on these findings the following recommendations are considered warranted: (1) Very strict quality control should be enforced during construction so that proper densities can be obtained. (2) Portland cement concrete pavements should be placed in refueling pit areas instead of tar-rubber pavements. (3) Tar-rubber pavements should not be used in aircraft parking areas where tire contact area is less than 100 sq in. and tire pressure is greater than 250 psi. (4) Better housekeeping rules should be enforced to minimize deterioration from fuel spillage.

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SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

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Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-74-27	2. GOVT ACCESSION NO. AD A003 168	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) CONDITION SURVEY, FELKER ARMY AIRFIELD, FORT EUSTIS, VIRGINIA		5. TYPE OF REPORT & PERIOD COVERED Final report
7. AUTHOR(s) Ralph D. Jackson		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. Q6-1
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE November 1974
		13. NUMBER OF PAGES 20
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Flexible pavement performance and evaluation (Airfields) Rigid pavement performance and evaluation (Airfields) [Felker Army Airfield, Fort Eustis, Va.]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Subsequent to publication in 1958 of the last report on the airfield pavement facilities at Felker Army Airfield, a new fixed-wing runway and other pavement facilities have been constructed. This report describes these facilities and presents a summary of the load-carrying capacities of pavement facilities at the airfield.		

DD FORM 1473 EDITION OF 1 NOV 65 IS OBSOLETE

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-74-30	2. GOVT ACCESSION NO. AD A003 170	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) CONCRETE STRENGTH RELATIONSHIPS		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) George M. Hammitt II		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE December 1974
		13. NUMBER OF PAGES 27
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Load tests (Pavements) Rigid pavements		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This paper presents a summary of five strength tests currently being used to evaluate the load-carrying capability of concrete pavements. The five tests were those for compression, flexure, splitting tensile, ring tensile, and shearing. The strength relationships between these tests reported by 13 sources are presented. A combined analysis was performed on test results from 3640 concrete samples and the following relationships were developed: compressive strength = 10.02 (flexural strength) - 2123; compressive (Continued)		

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20. ABSTRACT (Continued):

strength = 12.53 (splitting tensile strength) - 1275; compressive strength = 9.75 (ring tensile strength) - 1786; compressive strength = 7.39 (longitudinal shear strength) - 1578; and flexural strength = 1.02 (splitting tensile strength) + 210.5. In view of the numerous factors influencing the relationships of the strengths of concrete, it is not surprising that no simple exact relation is applicable. However, these correlations are felt to be representative in lieu of specific testing for concrete pavement design and evaluation.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-1	2. GOVT ACCESSION NO. AD A005 007	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and subtitle) REVIEW OF CONSTRUCTION EQUIPMENT AND METHODS FOR PAVEMENTS		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Carlton L. Rone		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 4A162121A891 Task 04 Work Unit 502
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE January 1975
		13. NUMBER OF PAGES 11
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE		
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Flexible pavement construction Slip forms Pavement construction Specifications Paving equipment State of the art studies Rigid pavement construction		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The investigation reported herein was conducted to review methods and equipment being used by industry in the construction of pavements and to recommend changes to Corps of Engineers guide specifications to incorporate new methods and equipment. Literature reviews were conducted, and visits were made to construction sites and equipment manufacturers. Observations and measurements were taken on pavements constructed with slip-form pavers, and a separate report was written on the results. As a result of the overall investigation, (Continued)		

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20. ABSTRACT (Continued).

The pertinent guide specifications will be revised to allow the use of slip-form pavers for portland cement concrete pavements in airfield construction and to add methods of testing for quality of mixture and for determining mixing times. The results of the investigation also indicate that guide specifications should be changed by eliminating requirements for specific equipment and methods and adding requirements for an end product based on methods of testing to determine the quality of the end product.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-9	2. GOVT ACCESSION NO. AD A009 738	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) ENGINEER DESIGN TEST OF DOW'S 4- BY 4-1/2-FT TRUSS WEB HEAVY-DUTY LANDING MAT		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Carroll J. Smith		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 1T162112A528 Task 04
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Materiel Command 5001 Eisenhower Avenue Alexandria, Va. 22304		12. REPORT DATE April 1975
		13. NUMBER OF PAGES 69
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Aluminum landing mats Heavy-duty landing mats Traffic tests [Dow landing mats]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The investigation reported herein was conducted to evaluate an extruded truss web aluminum alloy landing mat that is designed, extruded, and supplied by the Dow Chemical Company, Midland, Mich. The mat is a 4- by 4-1/2-ft, multihollow 6061-T6 aluminum alloy panel which consists of two 24-in.-wide extrusions welded together to form the 4-ft width. The mat has an average weight of 6.28 lb per square foot of placing area including antiskid compound. (Continued)		

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20. ABSTRACT (Continued).

The panels interlock along the sides by means of a hinge-type connector, the components of which are integral parts of the panel extrusions. Short tubes matching the inside contours of the panel extrusion are inserted into each cavity and welded flush with the ends of the extrusion. Extruded end connectors are then welded to the ends of the extrusion to complete the mat panel. A symmetrical I-type end connector bar secures the end joints after individual panels have been placed together. One-half of the contracted mat quantity was fabricated by heat treating the extrusions but not aging until after the mat center weld seam was made. The remaining half of the mat was fabricated by both heat treating and aging the extrusions before any welding was done.

The 4- by 4-1/2-ft truss web mat was developed and designed to minimize the bow wave problem associated with the C-5A aircraft and also to satisfy the criteria for heavy-duty mat as established in the revised Qualitative Materiel Requirement (QMR). The investigation consisted of traffic tests to obtain information for use in evaluating the 4- by 4-1/2-ft truss web mat.

Traffic tests were conducted with the mat placed on a prepared subgrade and trafficked with a rolling wheel load simulating actual aircraft operations. The tests were conducted with a single-wheel load of 50,000 lb with a tire inflation pressure of 250 psi on a mat-surfaced subgrade with a CBR of 3.7 for both item 1 (mat oriented with internal ribs and center weld seam perpendicular to the direction of traffic; i.e., Dow 2- by 9-ft mat standard lay pattern) and item 2 (mat oriented with internal ribs and center weld seam parallel to the direction of traffic; i.e., XM19 mat lay pattern). A row of mat movement restrictors was placed across the test section width of item 1. The test quantities of mat which were aged before and after welding were kept separate in items 1 and 2 in order to evaluate each type mat. While static deflections were being measured with the test wheel on item 2 prior to traffic, small V-shaped dimples were formed on several panels. Due to the premature failure of the panels in item 2, the mat was removed from item 2 and the individual panels were rotated 90 deg and placed in a lay pattern with the mat's internal ribs and center weld seam perpendicular to the direction of traffic. The mat was assembled at an average placing rate of 355 sq ft per man-hour for items 1 and 2, which exceeds the minimum QMR requirement of 150 sq ft per man-hour. Results of this investigation indicated that the 4- by 4-1/2-ft truss web mat on items 1 and 2 sustained 2250 and 600 actual coverages, respectively. These are equivalent to 1704 and 551 coverages on a 4-CBR subgrade for items 1 and 2, respectively. Therefore, the mat in item 1 (Dow standard lay pattern) meets the QMR 1000-coverage requirement for a heavy-duty mat on a 4-CBR subgrade. The mat movement restrictors will sustain without damage in excess of 600 coverages of the heavy-duty loading. Aging the mat either before or after welding had no significant influence on the performance of the mat.

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Technical Report Documentation Page

1. Report No. FAA-RD-73-197		2. Government Accession No. AD A009 012		3. Recipient's Catalog No.	
4. Title and Subtitle POROUS FRICTION SURFACE COURSE				5. Report Date February 1975	
				6. Performing Organization Code	
7. Author(s) Thomas D. White				8. Performing Organization Report No. Miscellaneous Paper S-75-12	
9. Performing Organization Name and Address U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory Vicksburg, Miss. 39180				10. Work Unit No. (TRAIS)	
				11. Contract or Grant No. FA71WAI-218	
12. Sponsoring Agency Name and Address Federal Aviation Administration Systems Research & Development Service Washington, D. C. 20591				13. Type of Report and Period Covered Interim report December 1971-September 1973	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract A study was conducted on the use of porous friction courses for airport pavements as a means of alleviating aircraft hydroplaning. The study consisted of a laboratory investigation of material requirements and mix design development and of a field study of construction control, construction processes, and long-term performance. The laboratory results were correlated where possible with the field observations. Satisfactory performance was obtained with a recommended aggregate gradation. A procedure for obtaining a design asphalt content and field mixing temperature, minimum field permeability values, and laboratory procedures for conducting permeability tests are described. A standard recommended guide specification is also included as an appendix.					
17. Key Words Coarse aggregates Skid surfaces Construction control Design standards Hydroplaning (Paved surfaces) Nonskid surfaces				18. Distribution Statement Approved for public release; distribution unlimited.	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 117	
				22. Price	

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-13	2. GOVT ACCESSION NO. AD A012 068	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) ENGINEER DESIGN TESTS OF DOW TRUSS WEB LANDING MATS WITH WATERPROOFABLE CONNECTORS AND SEALS		5. TYPE OF REPORT & PERIOD COVERED Final Report
7. AUTHOR(s) Gordon L. Carr		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Materiel Command 5001 Eisenhower Avenue Alexandria, Va. 22304		10. PROGRAM ELEMENT PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 1T162112A528 Task 04
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE May 1975
		13. NUMBER OF PAGES 79
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Landing mats Sealers Waterproofing [Dow landing mats]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Dow truss web waterproofable landing mat was tested without seals under a 50,000-lb single-wheel load (SWL) with 250-psi tire inflation pressure on a 4- CBR subgrade to determine its life in coverages. The panels were placed at a rate of 822 sq ft per man-hour. The full and half panels sustained 1440 coverages of the above loading on a 4-CBR subgrade. A limited number of mats with seals were tested to evaluate the effectiveness of the seal using a C-5A loading (26,600-lb SWL with 100-psi tire inflation pressure) on a 12-CBR (Continued)		

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20. ABSTRACT (Continued).

subgrade during a 2-month period while natural and simulated rainfall of over 50 in. was recorded. No structural mat failures occurred; however, the seals leaked during the test. When removed, the seals were torn, dislodged, and distorted. For better seal performance, the seal material should be more durable and resilient. The seals should be positively attached to the mat and less susceptible to distortion.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper 8-75-14	2. GOVT ACCESSION NO. AD A012 142	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) LANDING MAT OVER MEMBRANE-ENVELOPED SOIL LAYERS		5. TYPE OF REPORT & PERIOD COVERED Final report
7. AUTHOR(s) Cecil D. Burns, George L. Regan		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project 4A062103A859. Task 02, Work Unit 02806
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE June 1975
		13. NUMBER OF PAGES 83
		15. SECURITY CLASS. (of this report) Unclassified
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Medium landing mats Membrane enveloped soil layer [XM18 and XM19 landing mats]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This study was conducted to evaluate the effectiveness of a membrane-encased soil layer (MESL) base course under medium-duty landing mat when subjected to C-141 aircraft loading. A special test section consisting of five test items was constructed and trafficked. Test item 1 was considered a control item and was designed to support about 1000 coverages of the C-141 aircraft loading. The design was based on current criteria for airfields surfaced with medium-duty mats. Items 2-5 were designed for MESL base courses of reduced thicknesses. (continued)		

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20. ABSTRACT (continued).

The test included both XM18 and XM19 mats. The test section was subjected to traffic with one main gear of a C-141 aircraft assembly (twin-tandem assembly) loaded to 146,000 lb. The membranes used for encapsulation of the base soil failed after about 400 coverages of the test load. However, traffic was continued until complete failure of all test items. The analysis of data obtained in this investigation indicated the following: (a) The performance of the control test item was in reasonable agreement with the existing thickness criteria. (b) The use of a high-strength MESL base under mat resulted in a reduction in thickness of the strengthening layer required between the subgrade and mat, as determined by current criteria. The indicated thickness reduction for the C-141 aircraft loading on medium-duty mat is about 25 percent. (c) The membranes used for encapsulation did not have sufficient strength to sustain the high deflections and deformation which developed under the C-141 aircraft loading for the full service life of the landing mat.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-16	2. GOVT ACCESSION NO. AD A032 652	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) M19 LANDING MAT UPLIFT		5. TYPE OF REPORT & PERIOD COVERED Final report
7. AUTHOR(s) Grady W. Leese		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Mississippi 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 4A162121AT31-02
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE June 1975
		13. NUMBER OF PAGES 29
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Aluminum landing mats Exhaust blast effects Jet blast resistant materials [M19 landing mat]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes an investigation to determine the uplift characteristics of M19 welded aluminum landing mat when it is subjected to the high-velocity exhaust blast of a jet engine. The investigation consisted of two phases. The first phase was a wind tunnel test of a half-scale section of the M19 mat panel which consisted of making pressure measurements on the upper and lower surfaces of the M19 landing mat model. The pressures were then integrated to (Continued)		

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20. ABSTRACT (Continued).

yield the uplift force and overturning moment acting on the model. This test gave information on the effect of the landing mat connector and angle of attack on the aerodynamic characteristics of the model. The second phase consisted of subjecting a panel of M19 landing mat to the exhaust blast of a J-35 jet engine and measuring the uplift forces on the panel created by the high-velocity blast of J-35 jet engine exhaust. The uplift forces on the mat panel were measured using bolts instrumented with strain gages which anchored the test panel to the concrete surfaced test area. The results of these tests indicated that the M19 landing mat panel, when subjected to high velocities, will have imposed on it aerodynamic loads which will lift the mat panel from the ground. The mat panels need to be anchored to the ground surface along edges of runways, taxi strips, aprons, etc., where the mat may be subjected to engine blast exceeding 80 fps.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-18	2. GOVT ACCESSION NO. AD A012 769	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AIRFIELD PAVEMENT CONSTRUCTION-SLIPFORM PAVING METHOD		5. TYPE OF REPORT & PERIOD COVERED Final report
7. AUTHOR(s) Frazier Parker, Jr.		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory Vicksburg, Mississippi 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE June 1975
		13. NUMBER OF PAGES
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Airfield construction Paving equipment Rigid pavement construction Slipforms		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report presents the results of a study conducted to evaluate the use of slipform paving equipment for the construction of airfield pavements. Nine construction projects were observed and smoothness measurements made on eight of these projects. Currently used equipment and construction practices are presented and analyzed; problem areas and corrective measures are discussed. Results from the smoothness measurements are presented and considered in terms of current construction requirements and the effect of the surface smoothness on the functional performance of the pavement. Although the elimination of fixed side forms is the most appealing feature of the slipform method, it also causes the most complications. The sophisticated equipment and grade and alignment control systems require highly trained personnel. Large quantities of low-slump (Continued)		

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20. ABSTRACT (Continued):

concrete are needed to ensure uniform forward movement of the paver. It is also imperative that the concrete have a uniform consistency. The construction of keys and keyways and the installation of dowels in longitudinal construction joints require special techniques. The free-standing or slipformed edges will slump to a certain extent. The magnitude of edge slump is directly proportional to slab thickness. Edge slump results in deviations of the surface from a straightedge which are greater along paving lane edges than in the interior of the paving lanes. If uncontrolled, excessive edge slump can cause problems during the construction of fill-in lanes and can result in depressions along longitudinal construction joints. Within the interior of paving lanes, the smoothness of the surface is comparable in the longitudinal and transverse directions and appears to be independent of slab thickness. Slipform pavers can be used to construct airfield pavements that are structurally and functionally adequate for aircraft operation. However, it will require a concentrated effort on the part of the engineer and the contractor to ensure that the design and specifications, field adjustments, and quality control procedures result in a pavement with the desired characteristics.

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SECURITY CLASSIFICATION OF THIS PAGE(When Data Entered)

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

Technical Report Documentation Page

1. Report No. FHWA-RD-75-48	2. Government Accession No. AD A020 309	3. Recipient's Catalog No.
4. Title and Subtitle A REVIEW OF ENGINEERING EXPERIENCES WITH EXPANSIVE SOILS IN HIGHWAY SUBGRADES	5. Report Date June 1975	6. Performing Organization Code
7. Author(s) Donald R. Snethen, Frank C. Townsend, Lawrence D. Johnson, David M. Patrick, Philip J. Vedros	8. Performing Organization Report No. USAE Waterways Experiment Station Miscellaneous Paper - Unnumbered	10. Work Unit No. (TRAIS) FCP 34D1-132
9. Performing Organization Name and Address Soil Mechanics Division Soils and Pavements Laboratory U. S. Army Engineer Waterways Experiment Station P. O. Box 631, Vicksburg, MS 39180	11. Contract or Grant No. Intra-Government Purchase Order No. 4-1-0195	13. Type of Report and Period Covered Interim Report
12. Sponsoring Agency Name and Address Offices of Research and Development Federal Highway Administration U. S. Department of Transportation Washington, D. C. 20590	14. Sponsoring Agency Code M-0222	
15. Supplementary Notes FHWA Contract Manager - Preston C. Smith (HRS-21)		
16. Abstract Volume change resulting from moisture variations in expansive soil subgrades is estimated to cause damage to streets and highways in excess of \$1.1 billion annually in the United States. Expansive soils are so areally extensive within parts of the United States that alteration of the highway routes to avoid the material is virtually impossible. This report presents the results of a review of current literature combined with details of experiences of selected state highway agencies on procedures for coping with problems associated with expansive soil subgrades. The report discusses the geologic, mineralogic, physical, and physicochemical properties which influence the volume change characteristics of expansive soils. Currently used techniques for sampling, identifying, and testing expansive materials are reviewed and discussed. Treatment alternatives for the prevention or reduction of detrimental volume change of expansive soil subgrades beneath new and existing pavements are presented and discussed.		
17. Key Words Expansive soils Highways Soil moisture Subgrades State of the art studies	18. Distribution Statement This document is available to the public through the National Technical Information Service, Springfield, VA 22161	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 137
		22. Price

Form DOT F 1700.7 (8-72)

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-21	2. GOVT ACCESSION NO. AD A013 515	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) JET BLAST TESTS ON FIBERGLASS-REINFORCED DCA-1295		5. TYPE OF REPORT & PERIOD COVERED Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Clarence R. Styron III		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT PROJECT, TASK AREA & WORK UNIT NUMBERS 1T162103A046 1T162112A131 1T162112A528
11. CONTROLLING OFFICE NAME AND ADDRESS Research, Development, and Engineering Directorate U. S. Army Materiel Command 5001 Eisenhower Avenue, Alexandria, Va. 22304		12. REPORT DATE July 1975
		13. NUMBER OF PAGES 17
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Dust control [C-5A aircraft] Fiber reinforced plastics Jet blast resistant materials Materials		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes an effort to evaluate a dust-control system consisting of DCA-1295 reinforced with fiberglass scrim when subjected to jet blast tests with associated wind velocities in the range of those caused by operating C-5A aircraft. A sand panel and two clay panels were treated with DCA-1295 and reinforced with fiberglass scrim and found to withstand air blast velocities greater than 125 mph. It was recommended that the dust-control system be tested for the heavy-lift helicopter and that additional testing under actual C-5A operations be conducted using multiple layers of the dust-control materials.		

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-75-23	2. GOVT ACCESSION NO. AD A016 854	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) EVALUATION OF A NUCLEAR ASPHALT CONTENT GAGE		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) George L. Regan		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavement Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS O&MA Program, Project 4K078012A061, Task 02 Work Unit 302
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE October 1975
		13. NUMBER OF PAGES 54
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Asphalts Measuring instruments Nuclear equipment		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The developments of nuclear asphalt content gages were reviewed and gage operation and use were studied in the laboratory to determine significant parameters that may affect nuclear gage results. Two Troxler Model 2226 Asphalt Content Gages, serial Nos. 307 and 308, were used in this study. Parameters investigated were (a) asphalt content; (b) moisture content; (c) aggregate gradation; (d) interactions of (a), (b), and (c); (e) sample size; and (f) sample temperature. Precision and accuracy experiments were conducted. (Continued)		

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20. ABSTRACT (Continued).

These included 2^n factorial experiments and stepwise multiple linear regression analyses of the results. Asphalt content determinations equaling or bettering those of the conventional extraction technique were obtained in considerably less time.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper M-76-1	2. JOINT ACCESSION NO. AD A021 652	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) PRELIMINARY TESTS OF GLOSS-REDUCTION AND COLORING AGENTS FOR CAMOUFLAGE OF POLYVINYL ACETATE DUST-CONTROL FILM		5. TYPE OF REPORT & PERIOD COVERED Final report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Clarence R. Styron III Eugene E. Addor		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Mobility and Environmental Systems Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project 1A762719AT40, Task A3, Work Unit 1006 (former 4A762719AT33)
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE February 1976
		13. NUMBER OF PAGES 19
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Camouflage Materials Coloring agents Polyvinyl acetate Dust control Gloss reduction		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) DCA-1295 is a special polyvinyl acetate (PVA) formulation developed for the U. S. Department of the Army for use as a dust-control surface on expedient airstrips and adjacent service areas. The PVA is sprayed over a fiberglass scrim to form a thin film over the ground surface, and has been field tested and proven effective for its design purpose. However, the PVA film cures to a glossy, highly reflective surface that can be easily detected by enemy surveillance systems, is potentially highly attractive to target-seeking missile guidance devices, and sometimes creates hazardous visibility (Continued)		

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20. ABSTRACT (Continued)

conditions for aircraft landings. The purpose of the work reported herein was to search for possible means for reducing the glossiness of the cured PVA surface, with the possibility for adding camouflage coloration also considered. A formula was found for mixing colored chalk dust (marking chalk powder) with DCA-1295 concentrate to produce an emulsion that can be painted (brushed, rolled, or sprayed) on the cured, in-place PVA film, and that cures to a tough, nonglossy, colored surface. This formulation formed a good bond with the cured film, and in a field test withstood direct sun and weather for 11 months, well beyond the 6-month design life of the film. In addition, this formulation was also applied, with satisfactory results, to a cured DCA-1295 film (without the fiberglass reinforcement) previously spray-coated onto metal landing mat and fiber membrane. None of the experimental substances (various paint flatteners and extenders, dyes, flat latex paint, and coloring powders) produced satisfactory results when admixed directly with the DCA-1295 emulsion for direct application to the fiberglass scrim during initial installation. It is recommended that the camouflage potential of chalk-dust PVA coating be further evaluated, including its effect on infrared and radar signatures, with particular emphasis on its potential use as a camouflage coating for fixed installations. It is also recommended that research be initiated toward developing a chemically compatible deglossing and coloring agent for inclusion in the DCA-1295 emulsion at its initial application.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper M-76-18	2. GOVT ACCESSION NO. AD B014 711L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) PRELIMINARY EVALUATION OF THE ABILITY OF THE C-12A AIRCRAFT TO OPERATE SAFELY ON SUBSTANDARD AIRSTRIPS		5. TYPE OF REPORT & PERIOD COVERED Final report
7. AUTHOR(s) Gary N. Durham Newell R. Murphy, Jr.		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Mobility and Environmental Systems Laboratory P. O. Box 631, Vicksburg, Mississippi 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Aviation Systems Command P. O. Box 209 St. Louis, Missouri 63166		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE October 1976
		13. NUMBER OF PAGES 106
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Distribution limited to U. S. Government agencies only; test and evaluation; October 1976. Other requests for this document must be referred to U. S. Army Aviation Systems Command, St. Louis, Missouri 63166.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Aircraft landing areas [Edwards Air Force Base, California] Mathematical models Surface roughness (Pavements) Ride dynamics		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes the results provided to the U. S. Aviation Systems Com- mand (AVSCOM) by the U. S. Army Engineer Waterways Experiment Station in sup- port of a program to evaluate the ability of the C-12A aircraft to operate safely on substandard airstrips. Platform-drop and discrete-obstacle tests were conducted with an instrumented C-12A aircraft to determine critical reson- ances and spring and damping rates for inputs to a mathematical model. The model, which is a modified version of one currently used to describe the (Continued)		

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20. ABSTRACT (Continued)

kinematics of ground vehicles, is proposed to be used in a later phase of the program as an evaluation tool. Its prediction accuracy was checked by comparing results of simulated and actual drop tests. There are deviations between the measured and predicted responses, but they are not considered to be of major importance. It is noted that certain deficiencies will have to be addressed and an extensive sensitivity analysis made before the model can be used to suitably represent aircraft operations.

Data obtained at four airstrips in the vicinity of Edwards AFB, California, permit a characterization of the strips in the quantitative terms necessary for suitable relations of aircraft response. The airstrips are characterized in terms of Fourier spectra, rms roughness levels, and bump-height distributions. Airfield cone index is used to evaluate soil strength.

A test plan is recommended to evaluate the aircraft's ability to negotiate discrete obstacles and to operate on various substandard airstrips. The plan consists of a series of tests on four specified obstacle configurations designed to excite various components of the aircraft. The test sequence on each obstacle configuration is designed to begin at low response levels and progressively increase in intensity until one of the aircraft's critical components reaches 80 percent of its design limit. This requires continuous monitoring of the dynamic responses during testing.

A sequence of landing, takeoff and taxi tests is planned for the four substandard airstrips that will allow an evaluation of aircraft responses as a function of speed and surface roughness. The results of these performance tests should provide the data from which an empirical method for forecasting safe operations of the aircraft can be developed.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM								
1. REPORT NUMBER Miscellaneous Paper S-76-10	2. GOVT ACCESSION NO. AD A026 843	3. RECIPIENT'S CATALOG NUMBER								
4. TITLE (and Subtitle) VIBRATORY COMPACTION OF BITUMINOUS CONCRETE PAVEMENTS		5. TYPE OF REPORT & PERIOD COVERED Final report								
		6. PERFORMING ORG. REPORT NUMBER								
7. AUTHOR(s) Cecil D. Burns		8. CONTRACT OR GRANT NUMBER(s)								
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS								
11. CONTROLLING OFFICE NAME AND ADDRESS Headquarters, U. S. Air Force Washington, D. C. 20332		12. REPORT DATE June 1976								
		13. NUMBER OF PAGES 54								
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified								
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE								
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.										
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)										
18. SUPPLEMENTARY NOTES										
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) <table border="0"> <tr> <td>Bituminous concretes</td> <td>Rubberized tar</td> </tr> <tr> <td>Flexible pavements</td> <td>Vibratory compaction</td> </tr> <tr> <td>Hot mix</td> <td>Vibratory compactors</td> </tr> <tr> <td>Overlays (Pavements)</td> <td></td> </tr> </table>			Bituminous concretes	Rubberized tar	Flexible pavements	Vibratory compaction	Hot mix	Vibratory compactors	Overlays (Pavements)	
Bituminous concretes	Rubberized tar									
Flexible pavements	Vibratory compaction									
Hot mix	Vibratory compactors									
Overlays (Pavements)										
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) <p>This study was conducted to evaluate the effectiveness of vibratory rollers in the compaction of hot-mix asphaltic concrete and rubberized-tar concrete to satisfy the needs of the Air Force. The study consisted of overlaying an existing heavy gear load test section at the U. S. Army Engineer Waterways Experiment Station, which consisted of rigid and flexible pavements, with asphaltic concrete and rubberized-tar concrete pavements. The overlay</p> <p style="text-align: right;">(Continued)</p>										

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20. ABSTRACT (Continued).

pavements were compacted with two selected vibratory rollers, a Buffalo-Bomag BW210-A and a Dynapac CC-50A. A conventional steel-wheeled static roller and a pneumatic-tired static roller were also used for comparison. Variables included in the study were roller weight, frequency and amplitude of vibration, number of roller passes, type of roller (vibratory or static), type of foundation, and type and thickness of overlay pavements. The significant findings from this study are that (a) vibratory rollers of the type used are satisfactory for the compaction of high-quality bituminous concrete pavements, and (b) if properly used, they can provide densities meeting the requirements of the Air Force and the Corps of Engineers.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-76-13	2. GOVT ACCESSION NO. AD A025 245	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) FIELD PERFORMANCE OF POROUS FRICTION SURFACE COURSE		5. TYPE OF REPORT & PERIOD COVERED Final report; December 1971- June 1975
7. AUTHOR(s) Thomas D. White		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Mississippi 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Department of Transportation, Federal Avia- tion Administration, Systems Research and Develop- ment Service, Washington, D. C. 20591		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Inter-Agency Agreement No. DOT FA71WAI-218
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE April 1976
		13. NUMBER OF PAGES 67
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Also published as FAA Report No. FAA-RD-74-38.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Construction control Design standards Flexible pavements Seal coats		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report presents the results of a field performance survey first described in Report No. FAA-RD-73-197. Additional prototype construction experience and validation of a design procedure including a desired mixing viscosity range are reported. Long-term porous friction course (PFC) performance is recorded and combined with laboratory test results that provide data for a new recommended PFC gradation, water permeability requirements, and initial voids total mix requirements.		

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper - Unnumbered	2. GOVT ACCESSION NO. AD A025 442	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) SYMPOSIUM ON NONDESTRUCTIVE TEST AND EVALUATION OF AIRPORT PAVEMENT, 18-20 NOVEMBER 1975, VICKSBURG, MISSISSIPPI		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE May 1976
		13. NUMBER OF PAGES 114
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Airfields Meetings Nondestructive tests Pavement performance and evaluation Pavements		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The 22 papers presented included the Federal Government's role in pavement evaluation, the airport operators' and airlines' views on the use of non-destructive evaluation procedures, descriptions of procedures and equipment that have been developed and used in nondestructive testing, results of research under way, and one paper discussing the value of nondestructive testing techniques for pavement evaluation.		

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-76-14	2. GOVT ACCESSION NO. AD A030 540	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) INVESTIGATION OF FABRICS AND BITUMINOUS SURFACES FOR USE IN MESL CONSTRUCTION	5. TYPE OF REPORT & PERIOD COVERED Final report	
	6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s) Steve L. Webster Robert A. Andress	8. CONTRACT OR GRANT NUMBER(s)	
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 4A762719AT31, Task 01, Work Unit 002	
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314	12. REPORT DATE August 1976	
	13. NUMBER OF PAGES 68	
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified	
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE	
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Bitumens Fabrics Liquid asphalt Membrane enveloped soil layer Membranes		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The objectives of this study were to develop and test new waterproof membranes and pavement surfacings for membrane-enveloped soil layers (MESL) and to establish design criteria for their use. Three separate test series were conducted at the Waterways Experiment Station (WES) circular test facility. Various test items containing new membranes for MESL and items containing MESL with different pavement surfacings were tested. Test traffic was applied using a load cart equipped with a military truck, dual-wheel (Continued)		

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20. ABSTRACT (Continued).

assembly loaded to simulate an 18-kip axle load. Test results showed that both cationic and anionic emulsified asphalts are suitable for use in upper membranes for MESL. However, the rapid- and medium-curing grades of cutback asphalts are not suitable. Several nonwoven fabrics were found suitable for use with emulsified asphalt for constructing wearing membranes for MESL. Design criteria regarding membranes and wearing surfaces are offered.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-76-19	2. GOVT ACCESSION NO. AD A031 351	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) RECOMMENDED DESIGN FOR RIGID-FLEXIBLE AIRFIELD PAVEMENT JUNCTURES		5. TYPE OF REPORT & PERIOD COVERED Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Eugene C. Odom		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project 4A762719AT40 Task A2 Work Unit 001
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE September 1976
		13. NUMBER OF PAGES 27
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Airfields [Columbus AFB, Columbus, Miss.] Flexible pavements [Williams AFB, Chandler, Arizona] Joints (Junctions) Rigid pavements		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) A study was conducted on the performance of junctures between rigid and flexible airfield pavements constructed using present criteria. The study consisted of field inspections of 14 rigid-flexible pavement junctures at Williams AFB, Arizona, and Columbus AFB, Mississippi, and discussions of the performance of these junctures with Base Civil Engineering Office personnel. Of the 14 junctures studied, 4 have been repaired and are now in good condition, 1 is in good to fair condition, 1 is in only poor to fair condition, and 8 are in (Continued)		

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20. ABSTRACT (Continued).

good condition. Although the junctures have performed generally well, the asphaltic concrete pavement portions have experienced some minor problems (namely, bumping, transverse cracking, and surface depressions). From the problems associated with the junctures studied, it is recommended that the present design be revised slightly. A recommended revision of the design of rigid-flexible airfield pavement junctures is described. The revision involves use of expansion joints, increased thickness of the asphaltic concrete, and special rolling procedures for the asphaltic concrete binder and surface courses.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-76-20	2. GOVT ACCESSION NO. AD B015 023L	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) EVALUATION OF SALVIACIM PAVEMENT		5. TYPE OF REPORT & PERIOD COVERED Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Carlton L. Rone		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 4K078012AQ61
11. CONTROLLING OFFICE NAME AND ADDRESS Office, Chief of Engineers, U. S. Army Washington, D. C. 20314		12. REPORT DATE October 1976
		13. NUMBER OF PAGES 57
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Distribution limited to U. S. Government agencies only; test and evaluation; October 1976. Other requests for this document must be referred to Office, Chief of Engineers, U. S. Army, Washington, D. C. 20314.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Fuel spillage (Pavements) Jet fuel resistant materials [Salviacim pavement]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This investigation was conducted to evaluate the effectiveness of a special pavement surfacing material called Salviacim to resist the detrimental effects of fuel and oil spillage and scuffing from maneuvering of tracked-type vehicles. Salviacim pavement consists of an open-graded (18 to 25 percent voids total mix- ture) asphaltic concrete base mat with Salviacim grout spread on the surface and vibrated into the voids with a light vibratory roller. Salviacim is a proprietary material developed in France and has been used in Europe, South (continued)		

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20. ABSTRACT (continued).

Africa, Japan, and other places with apparent good success. Material was purchased from the H. F. Campbell Company, Detroit, Mich., the distributor of this material in the United States. A test section was constructed in accordance with instructions furnished by the H. F. Campbell Company and subjected to fuel and oil spillage tests and maneuvering of tracked-type vehicles. The test section was subjected to spillage of JP-4 fuel and a synthetic-base aircraft turbine engine lubricating oil. Tracked-type vehicles used for maneuvering were an M56 mobile gun, an M113 armored personnel carrier, and an M48A1 tank. The Salviacin pavement developed cracks during curing that were penetrated by the fuel and oil which softened the asphaltic concrete binder and caused the pavement to lose stability. The results of this study indicate the surfacing is not as resistant to maneuvering of tracked-type vehicles as a dense-graded, well-compacted asphaltic concrete.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-76-22	2. GOVT ACCESSION NO. AD A033 702	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) AIRFIELD PAVEMENT EVALUATION, BUTTS ARMY AIRFIELD, FORT CARSON, COLORADO		5. TYPE OF REPORT & PERIOD COVERED Final Report
7. AUTHOR(s) Philip J. Vedros		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Department of the Army, Headquarters Fort Carson, Colorado 80913		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (If different from Controlling Office)		12. REPORT DATE November 1976
		13. NUMBER OF PAGES 24
		15. SECURITY CLASS. (of this report) Unclassified
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Flexible pavement performance and evaluation (Airfields) Rigid pavement performance and evaluation (Airfields) [Butts Army Airfield, Fort Carson, Colorado]		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of this report is to upgrade the last evaluation report (October 1960) that was prepared for this airfield. The new evaluation is based on field in-place tests requested by the Facilities Engineer at Fort Carson and performed by the Lincoln DeVore Testing Laboratory of Colorado Springs. An inspection of the condition of the pavement was made by U. S. Army-Engineer Waterways Experiment Station personnel on 6 November 1975.		

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM										
1. REPORT NUMBER Miscellaneous Paper S-76-23	2. GOVT ACCESSION NO. AD A033 994	3. RECIPIENT'S CATALOG NUMBER										
4. TITLE (and Subtitle) SKID TESTS ON XML8, XML9, AND T11 LANDING MATS PLACED IN CONTACT WITH SOIL AND PLACED ON MEMBRANE ON SOIL		5. TYPE OF REPORT & PERIOD COVERED Final report										
7. AUTHOR(s) Gordon L. Carr		6. PERFORMING ORG. REPORT NUMBER										
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)										
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Materiel Development and Readiness Command Alexandria, Va. 22333		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 1G764717DN01 Task 10										
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE November 1976										
		13. NUMBER OF PAGES 33										
		15. SECURITY CLASS. (of this report) Unclassified										
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE										
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)												
18. SUPPLEMENTARY NOTES												
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) <table border="0"> <tr> <td>Anchors (Fasteners)</td> <td>Skid resistance</td> </tr> <tr> <td>Coatings</td> <td>Skid tests</td> </tr> <tr> <td>Landing mats</td> <td>[T11 landing mat]</td> </tr> <tr> <td>Membranes</td> <td>[XML8 landing mat]</td> </tr> <tr> <td>Nonskid compounds</td> <td>[XML9 landing mat]</td> </tr> </table>			Anchors (Fasteners)	Skid resistance	Coatings	Skid tests	Landing mats	[T11 landing mat]	Membranes	[XML8 landing mat]	Nonskid compounds	[XML9 landing mat]
Anchors (Fasteners)	Skid resistance											
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Membranes	[XML8 landing mat]											
Nonskid compounds	[XML9 landing mat]											
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) <p>Tests were performed on landing mats and membranes to evaluate the anti-skid properties of paints and antiskid coating when each was in contact with a loaded rubber tire, and/or when each was in contact with soil or membrane. The data were used to determine the forces which were transmitted through the mats to the underlying materials and which the anchors would have to resist to prevent mat movement under a braking aircraft tire. Panels with antiskid on both sides increased the resistance of panels to sliding along the (Continued)</p>												

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20. ABSTRACT (Continued).

ground, which in turn reduced the forces transmitted to the mat anchors. Test data indicated that the anchors would have to resist greater forces produced by aircraft braking when the mats were placed on membrane than when the mats were placed directly on soil.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper S-76-24	2. GOVT ACCESSION NO. AD A033 914	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) USAGE OF LANDING MAT AS OVERLAY ON ASPHALT RUNWAY DURING MILITARY FIELD EXERCISES		5. TYPE OF REPORT & PERIOD COVERED Final Report
7. AUTHOR(s) Hugh L. Green		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Soils and Pavements Laboratory P. O. Box 631, Vicksburg, Miss. 39180		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Materiel Development and Readiness Command Alexandria, Va. 22333		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Project No. 1T162112A526, Task 04
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE December 1976
		13. NUMBER OF PAGES 75
		15. SECURITY CLASS. (of this report) Unclassified
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Flexible pavements Landing mats Landing strips Membranes (Airfields) Overlays (Landing mats)		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report describes four military exercises conducted at Oak Grove, H. C., in which XM18 landing mat was placed over a deteriorating asphalt runway to provide a landing strip for C-130 cargo aircraft. In the past, studies had been conducted at the WES on this subject; however, this was the first opportunity to gain firsthand knowledge on the behavior of the aircraft and the landing mat during a field exercise. This report is based on Memorandums for Record (MFR's) prepared for each of the exercises, which were conducted over a four-year period. Details of each exercise are described in the MFR's, which (Continued)		

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20. Abstract (Continued).

are presented in their entirety as appendixes in this report. The lessons learned that may be helpful in future installations of landing mat over asphalt are listed in the form of conclusions and recommendations. It is concluded that (a) the use of landing mats over an existing deteriorating asphaltic pavement will upgrade the pavement, and prevent foreign object damage to aircraft from occurring; (b) if there are no major potholes or "birdbaths" in the runway that would cause mat bridging, it is not necessary to place a leveling course of sand between the mat and the pavement; (c) if the deteriorated condition and roughness of the field dictate that a leveling soil course is required, a lightweight membrane should be placed between the soil and the landing mat to prevent pumping of the soil at the mat joints during inclement weather; and (d) plank-type landing mat, such as the XM18, can sustain horizontal movement in the direction of aircraft landings in the magnitude of approximately 25 in. without structural mat damage or adverse effects to the runway complex; however, based on similar exercises, a detrimental bow wave may develop if joints become tightly closed and this should be closely observed and avoided. This report should prove to be a valuable aid to a unit commander responsible for installation of landing mat over asphalt pavement.

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